# WESTERN GAS

June
1928

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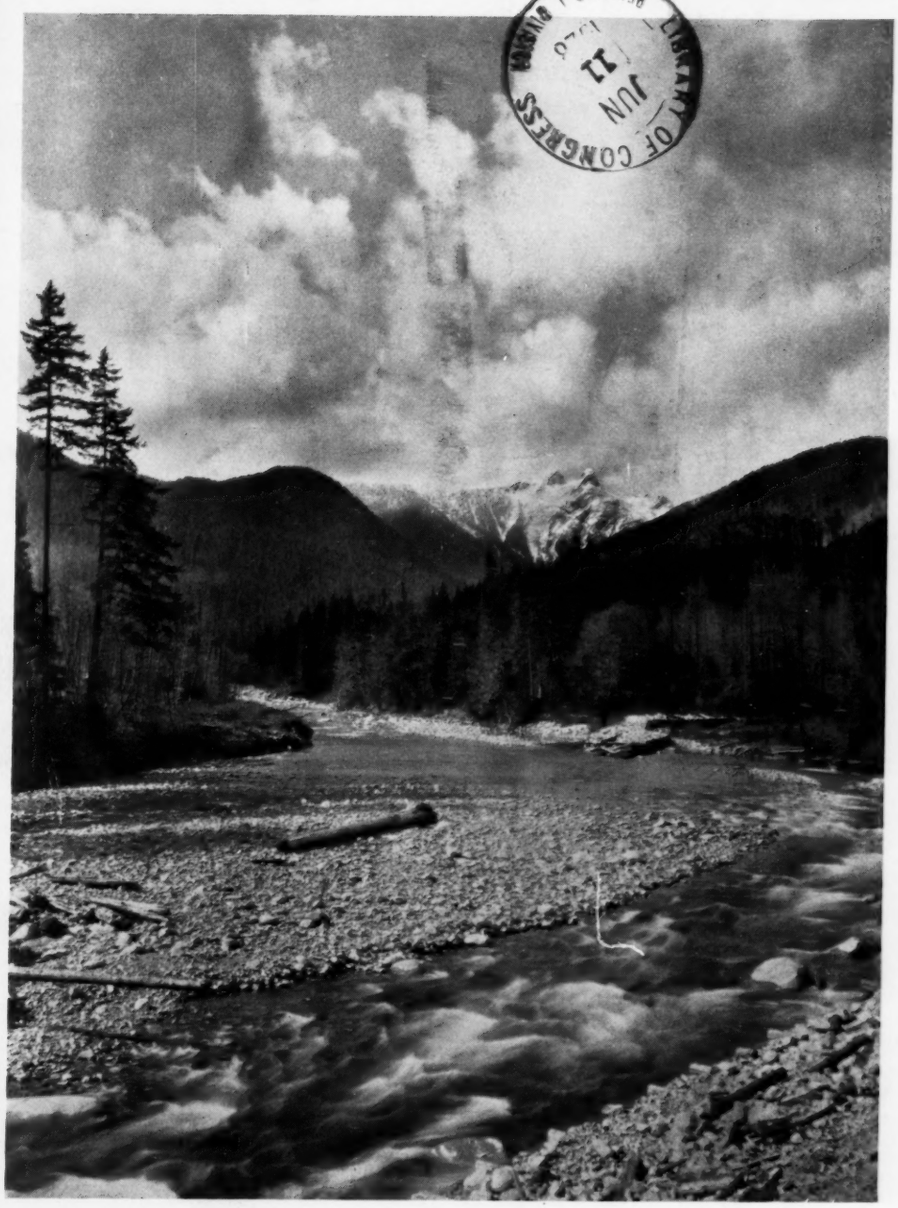


*Lynn Creek, on North Shore of Vancouver, B. C.—Such scenes will greet delegates to the Pacific Coast Gas Association's Northern Regional Conference, Vancouver, June 6-7*

20 Cents
the Copy

**A MONTHLY JOURNAL DEVOTED TO THE WESTERN GAS & APPLIANCE INDUSTRIES**

# *For* Curb & meter Service

MERCO

TRADE MARK

## *Type* R

Sizes, ¾", 1", 1¼", 1½"
For services not to exceed 100 lbs. air or water pressure or 50 lbs. gas or gasoline pressure.

**As a companion to our standard Nordstrom Valves we offer the Type R—a lubricated valve especially desirable for curb and meter service but not intended for high temperature or corrosive liquids such as acids, alkalis, etc. The Type R Nordstrom Valve embodies our exclusive Sealdport lubrication feature which makes a positive seal around the plug when valve is either open or closed,—preventing leakage and permitting easy turning at all times.**

**Gas Companies will find Type R an exceptionally superior valve—and economical in cost. Request details.**


**Merco Nordstrom Valve Company**

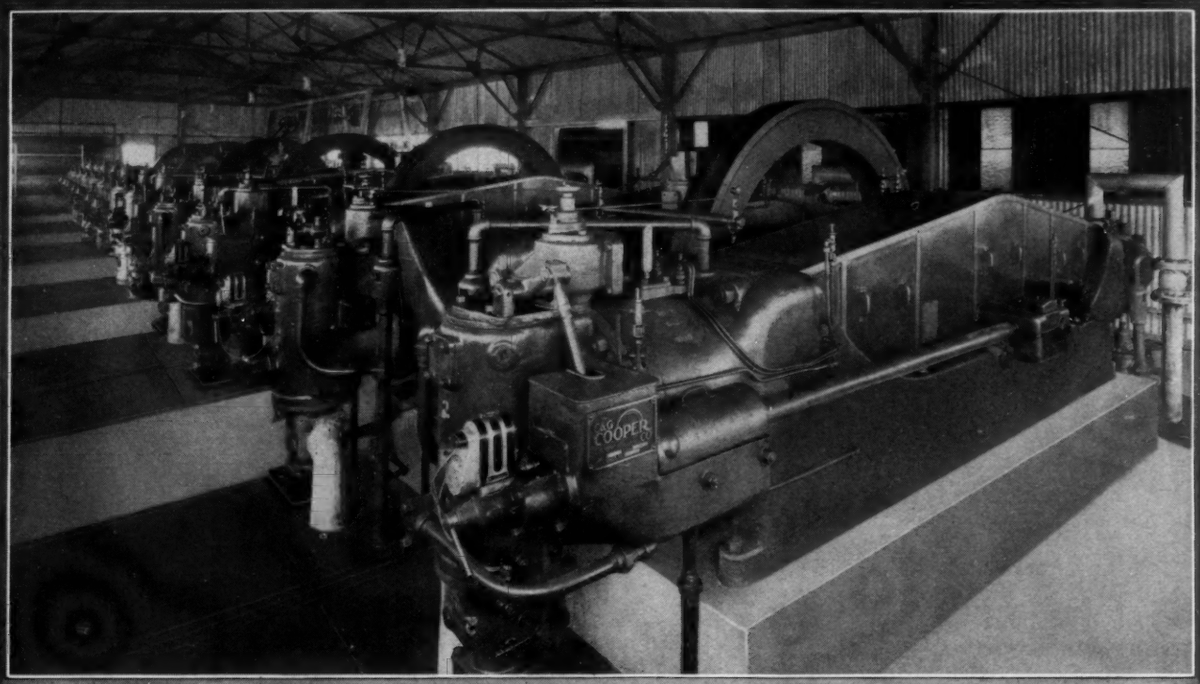
SUBSIDIARY OF THE MERRILL COMPANY

***Engineers—Manufacturers***

San Francisco.....121 Second St.
New York City.....11 W. 42nd St.
Chicago.....Peoples Gas Bldg.
New Orleans.....Masonic Temple Bldg.
Cleveland.....Engineers Bldg.
Houston.....Petroleum Bldg.

Agencies in Principal Cities
Factories at Oakland, Calif., and Belleville, N. J.


# *Nordstrom Valves*




**Magnolia Petroleum Company's Gas Lift Plant near Earlsboro, Oklahoma, contains six Cooper Type-80, 170 B. H. P. four-cycle gas engines.**

# "—And He Recommended Coopers"

A field superintendent was asked, "What gas engine would you recommend for a three-engine booster station?"

His reply was, "I believe I would use Cooper Type-80s."

When a field man with a reputation for unbiased judgment in such matters tells a friend in confidence to buy Coopers, his choice must be based on more than a shallow prejudice. It is reasonable to suppose that he took into consideration all of the factors which should affect the choice of a gas engine. Favorable first cost and cost of installation, low cost of operation and maintenance, field service and interchangeability of parts, workmanship, and materials and age and reputation of the builder. On all of these points you will find Coopers rate unusually high.

## THE C. & G. COOPER COMPANY

Los Angeles, Calif.
649 S. Olive Street

Dallas, Texas
1111 Magnolia Bldg.

Tulsa, Okla.
615 Kennedy Bldg.

June, 1928, Volume IV, Number 6. WESTERN GAS is published by Western Business Papers, Inc., at 124 West Fourth Street, Los Angeles, California. Subscription price (in advance) 20 cents the copy; $2.00 per year; 3 years $5.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, California, under the Act of March 3, 1879.

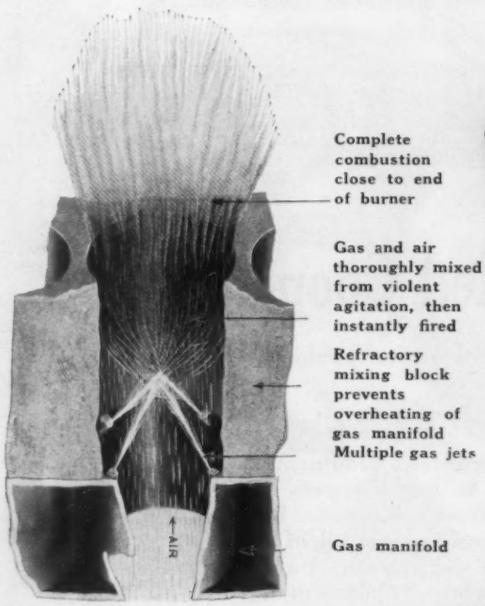
# Use

# *Mettler* Entrained Combustion Gas Burners

## Nearly 10,000 of them now in use burning over 20,000,000 cubic feet of gas per hour

# *There is a Good Reason*

## Study the cuts below

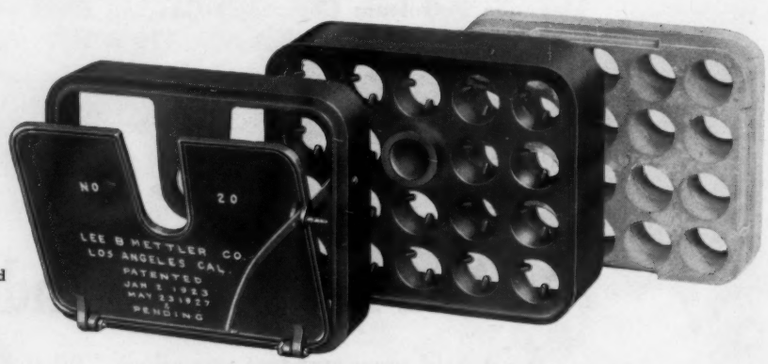



Complete combustion close to end of burner

Gas and air thoroughly mixed from violent agitation, then instantly fired

Refractory mixing block prevents overheating of gas manifold Multiple gas jets

Gas manifold



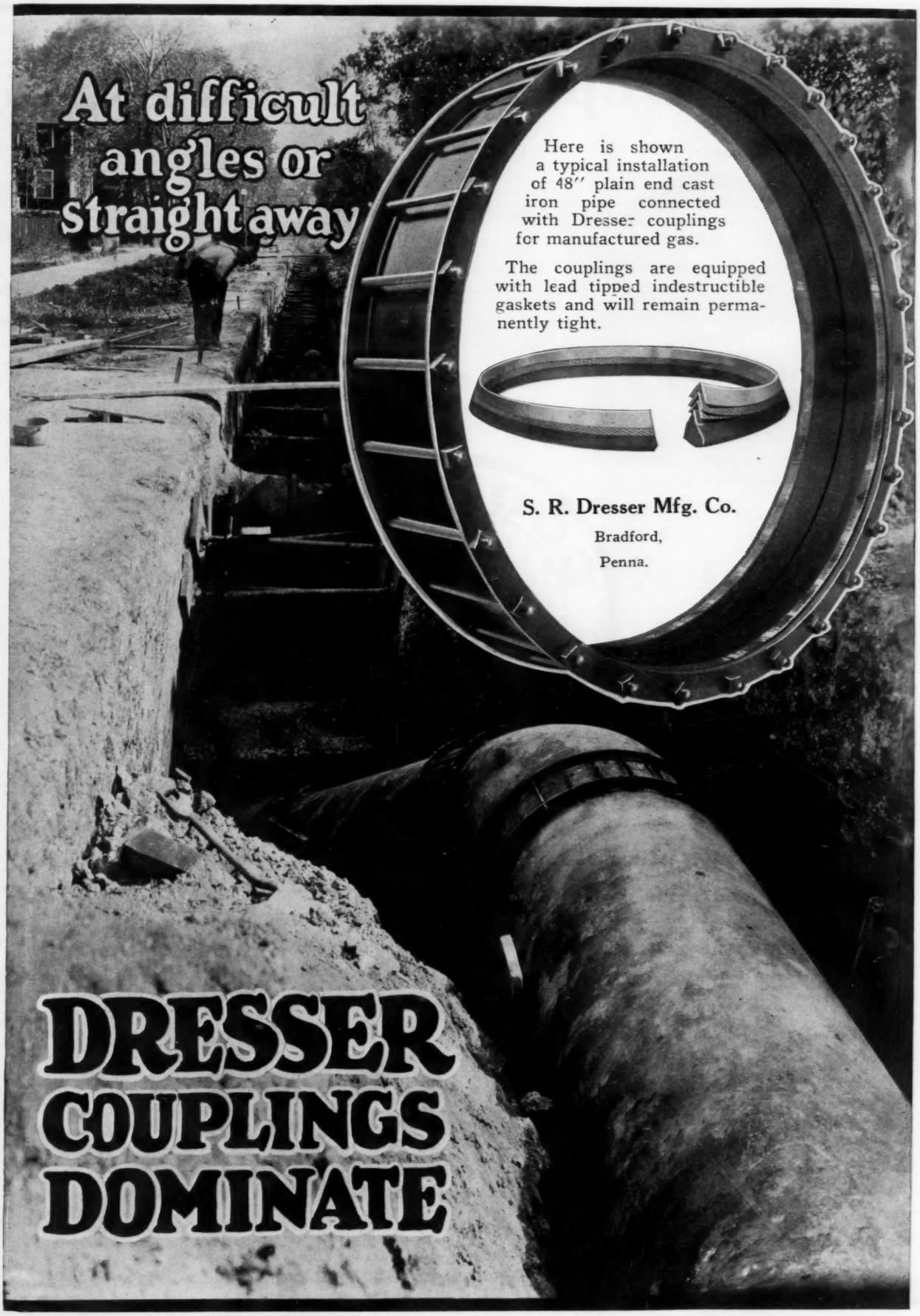

**Only *three parts* to a *Mettler Burner***
***Nothing* to burn out or get out of order**
***Will last a life time***

It is not what enthusiastic salesmen claim—
It is not what expert Combustion Engineers can do—
It is what **your Boiler Room Operator** can do that counts, and with Mettler Entrained Combustion Gas Burners he can't fail to

## Reduce Your Gas Bill!

Mettler Burners are designed on the Multi-Unit Multi-Jet Principle, producing thorough mixture of gas and air, resulting in complete combustion close to the end of the burner with a minimum of excess air and maximum furnace temperatures.

**Mettler Entrained Combustion Gas Burners**
**FOR ALL** Purposes, Kinds of gas, Pressures
406 S. Main St. **LEE B. METTLER CO.** Los Angeles, Cal.


At difficult angles or straight away
Here is shown a typical installation of 48" plain end cast iron pipe connected with Dresser couplings for manufactured gas.
The couplings are equipped with lead tipped indestructible gaskets and will remain permanently tight.
S. R. Dresser Mfg. Co.
Bradford,
Penna.
DRESSER COUPLINGS DOMINATE

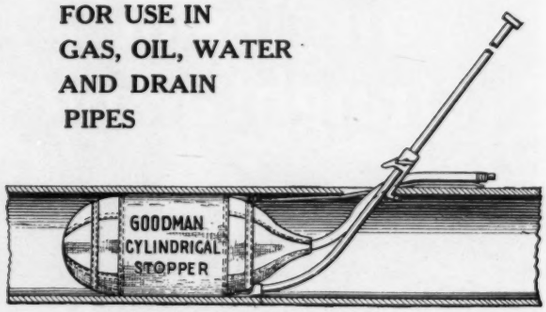
# Street Department Supplies

## Gas Main Bags

THREE TYPES

TYPE A—Seamless.
TYPE B—Reinforced Seams
TYPE C—Canvas Covered

FOR USE IN
GAS, OIL, WATER
AND DRAIN
PIPES



## Air Line Mask

With or without Blower.

Mask and Blower in separate cases.

Blower will supply sufficient air for 4 masks.

If you have not received your copy of our new catalogue, please let us know.

## Safety Gas Main Soap Tape

For bandaging broken pipe. Also binding tape to cover soap tape bandage.

Sample on request.

# *Safety Gas Main Stopper Co.*

*523 Atlantic Avenue, BROOKLYN, N. Y.*

New England Representative
The Eastern Service Co., Boston, Mass.

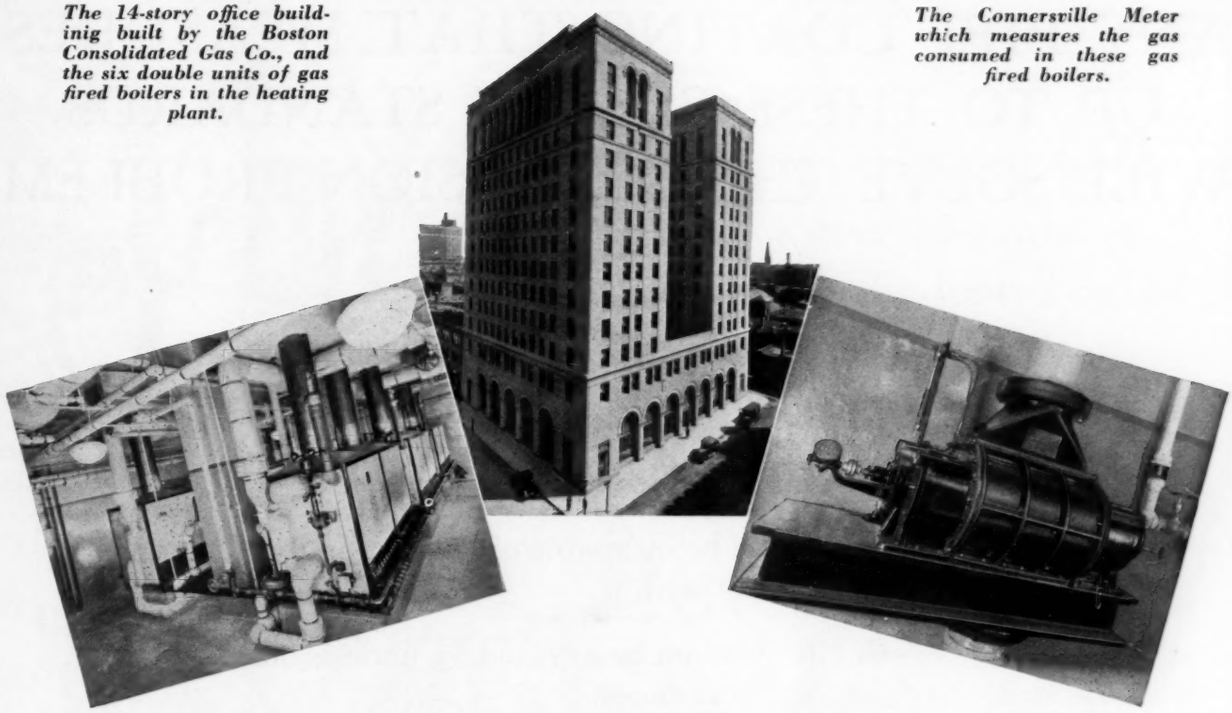
Texas-Louisiana Representative
Maintenance Engineering Corp.
Box 1402, Houston, Texas

Pacific Coast Representative
C. B. Babcock Co., San Francisco, Calif.

Mid-Western Representative Circle Corporation Tulsa, Oklahoma

*The 14-story office buildinig built by the Boston Consolidated Gas Co., and the six double units of gas fired boilers in the heating plant.*

*The Connersville Meter which measures the gas consumed in these gas fired boilers.*



# And Connersville Meters for the Heating Installations also

As the heating load is developed, you, of course, seek the most suitable metering equipment, that your customer, and yourself, may be completely satisfied. You will want a meter that is, first of all, dependably accurate; that may be easily set in the gas lines; that does not require too much space; that does not require frequent adjustment and repairs.

When the Boston Consolidated Gas Company was choosing equipment for the heating plant of their new 14 story office building, gas was the fuel, of course. Six double units of gas fired boilers are installed.

A Connersville Rotary Displacement Meter is used to accurately measure the gas consumed. While this meter has a normal rating of 25,000 cu. ft. per hour, it maintains the accuracy throughout the range of variations in the heating load. Then, too, it was easy to set in, for there were only two connections to make. Since the displacement is a fixed volume that cannot be varied, they will not need to send this meter to the repair shop for frequent adjustment.

Such advantages can make your larger heating installations more satisfactory and profitable, too. Ask our nearest office for infomation and prices.

## THE CONNERSVILLE BLOWER COMPANY

**Michigan Avenue at 16th Street**
**Connersville, Indiana**

**53 W. Jackson Blvd.**
**Chicago**

**114 Liberty St.**
**New York**

**Chamber of Commerce Bldg.**
**Pittsburgh**

# CONNERSVILLE

Blowers • Gas Pumps • Meters • Cycloidal Pumps

# ANY PIPE COATING THAT MEASURES UP TO THESE ELEVEN STANDARDS WILL SOLVE THE CORROSION PROBLEM

1. It must be waterproof.
2. It must be unaffected by soil acids and alkalies.
3. It must have good adhesive qualities.
4. It must not disintegrate with age.
5. It must be incapable of absorption by the soil in contact with it.
6. It must not be affected by underground temperature changes.
7. It must be a dialectric, in order to offer protection against electrolysis.
8. It must be capable of practical and speedy application in the field.
9. It must be unaffected by ordinary handling in the field and not damaged by lowering into the ditch.
10. It must be of substantial thickness.
11. It must be economical.

**Biturine Enamel is a heavy, quick-setting bituminous coating, tough but not brittle. It is applied hot and requires no wrapping. Adheres tightly to metal and will not crack. It is absolutely impervious to corrosive elements.**

**Biturine Enamel is manufactured by Hill, Hubbell & Company as one of a special line of paints for the oil industry.**

**No skilled labor necessary to apply Biturine Enamel.**

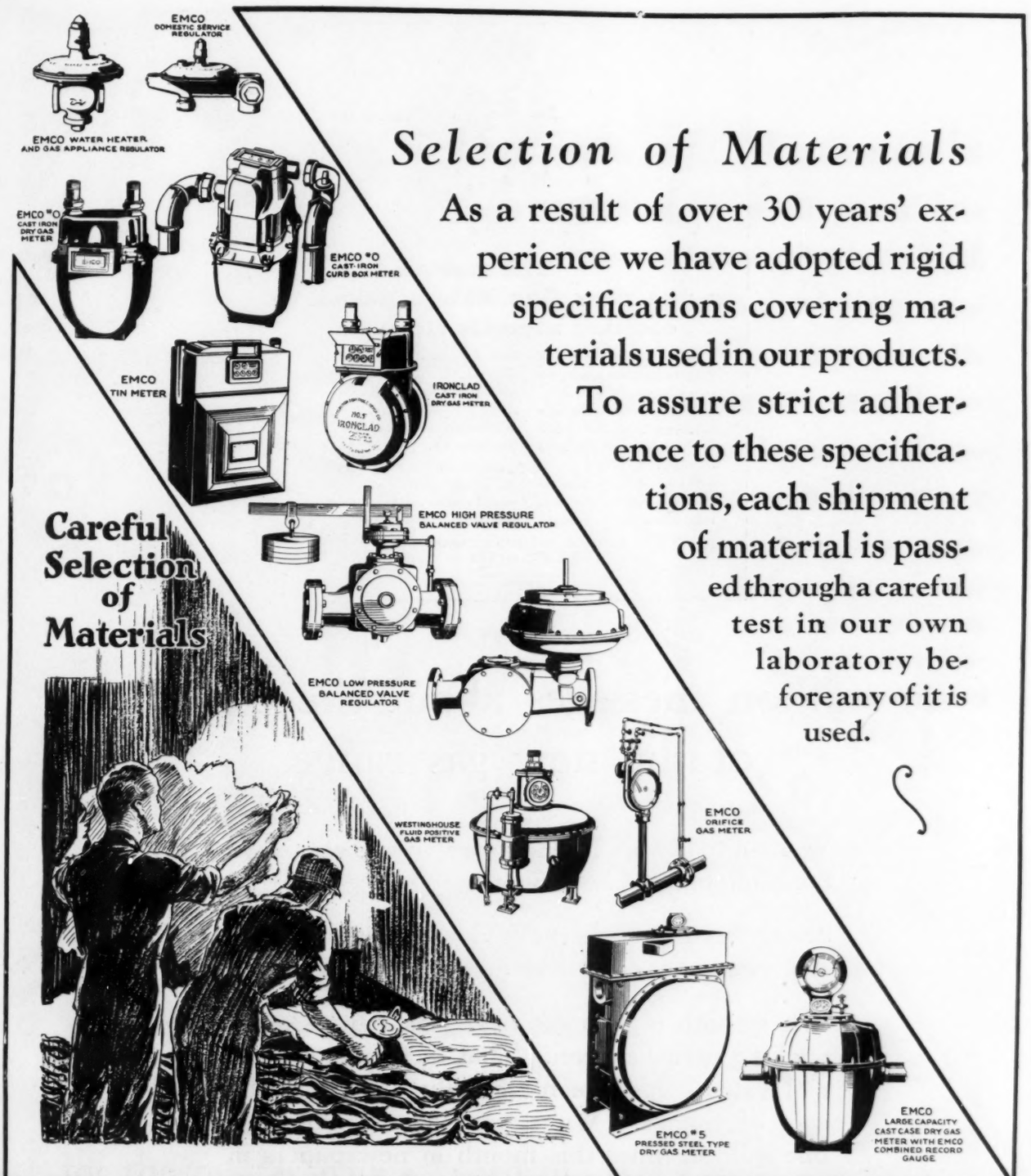
**Valuable, practical data and specifications furnished upon request.**

For 16 years Biturine Enamel has been the choice of oil and gas industry executives who have found it has fulfilled every requirement. It has proven to be the permanent corrosion preventive.

## HILL, HUBBELL & COMPANY

*Manufacturers of*
*Highest Grade Oil Industry Paints and Pipe Line Coatings*
*Factories at SAN FRANCISCO and TULSA*
*District Offices:*

SAN FRANCISCO
SEATTLE
LOS ANGELES
TULSA
PORTLAND
HOUSTON
NEW YORK CITY
BALTIMORE




## Careful Selection of Materials

## *Selection of Materials*

As a result of over 30 years' experience we have adopted rigid specifications covering materials used in our products. To assure strict adherence to these specifications, each shipment of material is passed through a careful test in our own laboratory before any of it is used.

# PITTSBURGH EQUITABLE METER COMPANY

**MAIN OFFICE AND WORKS PITTSBURGH, PA.**

NEW YORK CHICAGO COLUMBIA, S.C. LOS ANGELES DALLAS
TULSA SEATTLE KANSAS CITY SALT LAKE CITY

**The smooth top on the new Gas Range keeps cooking utensils clean**

When you are in your kitchen you put on an apron, even if your kitchen is spotlessly clean.

Gas is a clean fuel. However, a smooth top is built into the new Gas Range to give you added cleanliness.

The smooth top protects the gas burners from food that would otherwise boil over onto the burners. For clean burners mean clean heat. The smooth top distributes heat evenly and one burner keeps several vessels boiling. It sends products of combustion up the flue.

See the new Gas Range with the smooth top built into the range for added cleanliness. Enjoy this range's fine cooking.

PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed
*by Californians*

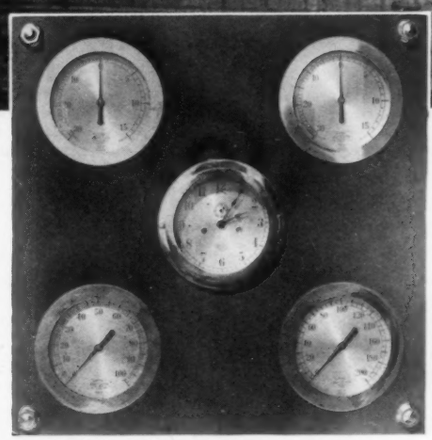
# One million messages about the cleanliness of the new gas range

Women today are looking for ways to eliminate the monotony of housework.

Show them how the new Gas Range does this and you get their attention.

The smooth top on the new Gas Range keeps cooking utensils clean. That fact has commercial value. It's one more selling point in the sale of ranges. We're printing this message one million times this month in newspapers in our territory. Here's an aid in helping everyone sell more and better gas ranges.

PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed
*by Californians*



*The* City of Los Angeles chose CROSBY Steam Gauges for the master gauge board in its magnificent new City Hall.

WESTCOTT & GREIS, Inc.

SALES & SERVICE

1945 Santa Fe Avenue - - - Los Angeles

# WESTCOTT & GREIS

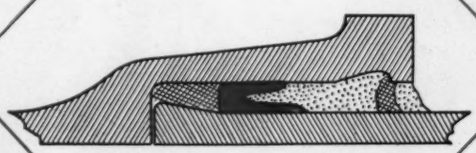
MEASUREMENT AND CONTROL

For Detailed Listings, Telephone Numbers, Etc., See the Buyers' First Aid—Page 143

Make Your
Gas Joints
Self Healing

Sample Ring for Test
Furnished on Request.
– No Charge –

SELF HEALING



SOUTHWESTERN
PIPE JOINT RINGS

SOUTHWESTERN PIPE JOINT &
ENGINEERING CO.
1108-1110 Fifth Avenue
BIRMINGHAM, ALABAMA

Back to Nature!

*Illustration of McWane Screw-Joint Gas Pipe ready to screw together. This joint is leak-proof, and exhaustive tests have proved it even stronger than the pipe itself because there is extra metal where the threads are cut.*

Nature works WITH, not against, us in making McWane Cast Iron Pipe!

**FIRST:** McWane Pipe is cast in green (damp) sand. When Nature made the iron ore that has existed for ages in the earth, she did not pour the molten mass into dry (baked) molds.

**SECOND:** McWane Pipe is "sand molded inside and out." The molten iron comes in contact with nothing but sand—Nature's own way! No oxidation! No chilling!

**THIRD:** The maximum distance molten iron travels in the mold to make McWane pipe is measured in inches—not feet. Nature penalizes long-distance casting.

All this means a strong, fine grained iron, extra resistant to corrosion and breakage, but easy to cut and tap.

*12′ or 16′ lengths above 4 inches in diameter.*

WRITE FOR ILLUSTRATED LITERATURE

McWANE CAST IRON PIPE CO.
BIRMINGHAM, ALA.

PACIFIC STATES CAST IRON PIPE CO.
PROVO, UTAH

SALES OFFICES IN PRINCIPAL CITIES

McWANE
CAST IRON PIPE

*Interchangeable Valves and Seats*

*It won't Stick*
*It Won't Freeze*

Gilfillan 2" H. P. Regulator
(Needle valve type)
Suitable for any known rock pressure

# A Good Regulator Any Place

Every Gilfillan Regulator is not adaptable for any job

*But—*

There is a Gilfillan Regulator for every job

## *Gilfillan Products*

**High Pressure Reducing Regulators**

**Low Pressure Control Regulators**

**Boiler Control Regulators**
(For Gas or Oil Fuel)

**Vacuum Control Regulators**

**Check or Back Pressure Regulators**

Gilfillan 2" L. P. Regulator
(Balanced valve type)
For reducing medium pressure to consumption pressure of ounces

*A complete pressure control manual—1928 Gilfillan Catalog—*
*from your nearest Gilfillan representative*

## GILFILLAN MACHINE WORKS, INC.

**Ebenezer, New York**

**Jensen Instrument Co.,**
**624 E. Fourth St.**
**Los Angeles**

**Gas Appliance Service Corp.**
**2014 Bryan St.**
**Dallas, Texas**

**The Diamond Supply Co.,**
**203 Davidson Bldg.**
**Charleston, W. Va.**

# Added Features of the "B" Meter

*The improved so-called "Slow Speed" meter has other features*

A MOST important feature in connection with the conservative speed of the "B" meter is the fact that while the meter's rated capacity under 5-10 inch loss is ample for normal working conditions, it is so constructed that it can take an overload of 50 per cent greater than its rated capacity. Thus the occasional peak load is provided for.

THIS extraordinary overload up to 50 per cent is taken care of with a maximum total loss not exceeding 1 inch. In our careful calculation of valve areas, channel areas and other construction details, we have maintained as closely as possible uniformity in capacity and in actual speed rate between the different sizes of meters.

*Pacific Meter Works*

of the
American Meter Company, Inc.
Northwestern Representative

SAN FRANCISCO
495 Eleventh St.

PORTLAND
Northwestern Gas and Electric Equipment Co.

LOS ANGELES
2118 Atlantic St.

# First aid to faces

The time has passed for a water heater to be considered as merely an aid to the maid on wash days. Water heater selling has stepped out of the old-fashioned order into a new and immensely profitable market. Today the Welsbach salesman offers the most appealing reason ever advanced *why a woman should own a Hotzone Water Heater:—*

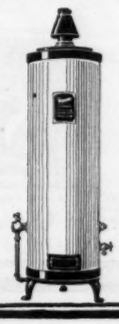
*Welsbach Hotzone Water Heaters are sold as an aid to beauty.* Here's a selling idea which intrigues a woman's interest from the very start.

You know that soap manufacturers, skin food advertisers and beauty specialists all prescribe hot towels, massages and shampoos before retiring. You know, too, that *all these treatments require hot water.* That's where Hotzone fits into the picture. This master heater brings clean, sparkling hot water—instantly. At any hour of the day or night it is always eager to offer first aid to faces.

So, step along with Welsbach. The road is smooth-paved and free from traffic. To aid you further, we offer a series of striking newspaper advertisements. They tell the beauty story in a way no woman can miss. These advertisements give Hotzone the "go" signal in any sales jam. Write for a set of proofs today. Address Welsbach Company, San Francisco Office, 863-865 Mission Street.

*Member of American Gas Association*
*Member of Pacific Gas Association*

**Welsbach**



**HOTZONE**

**SELF ACTION GAS WATER HEATER**

500 CR Series—5 section
400 CR Series—4 section
Finished in Mahogany,
Crystal Enamel

No. 401—4 section
No. 501—5 section
Finished in Antique
Brass or French Gray

No. 541—5 section
No. 641—6 section
Finished in Antique
Brass or French Gray

All Roper Sheetflame Radiant Heaters carry the Blue Star Seal of Approval of The American Gas Association Testing Laboratory.

# Let the *Solid Sheet* help the *Profit Sheet*

Put unprofitable customers into the profitable class —by selling them Roper Sheetflame Radiant Heaters.

Each sale you make means a double profit. First, a profit on the sale itself. Second, a profit on the increased use of gas per meter.

The Roper Sheetflame Radiant Heater is built on the correct principle for radiating heat. It is the only heater which operates with a solid sheet of flame extending across the entire heating surface.

It comes in a variety of designs and sizes to suit every taste and every buying habit.

It offers a wide choice of colors including Mahogany Crystal Enamel, Green Crystal Enamel, Red Brown Crystal Enamel and Black Enamel Finish; also in Antique Brass, Oxidized Brass and French Gray.

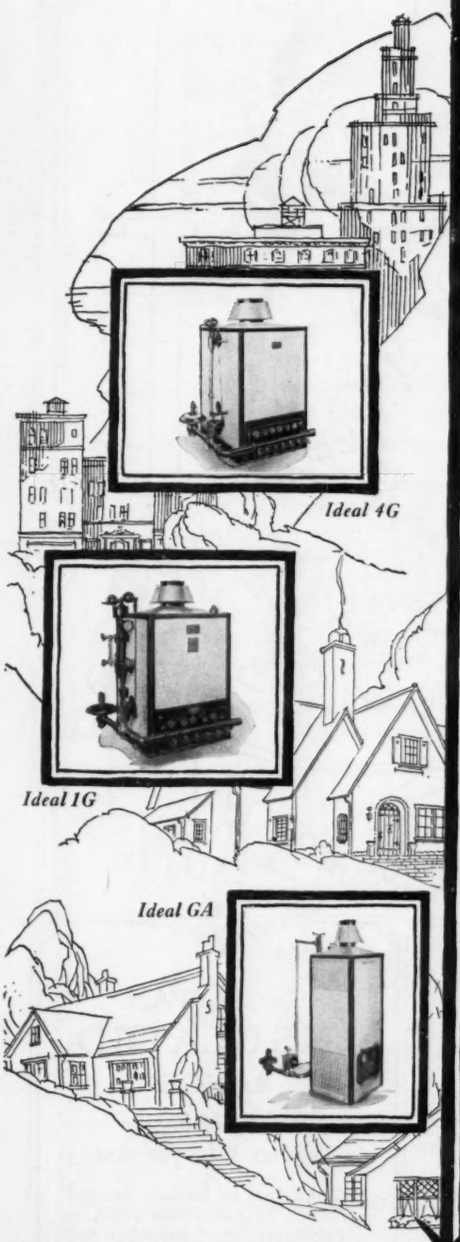
Let the Roper Sheetflame Radiant Heater line help you increase your sales of appliances and gas. Write or wire for complete information.

**Geo. D. Roper Corporation**
**Rockford, Illinois**

ROPER

Sheetflame
RADIANT HEATERS

THE SOLID SHEET THROWS OUT MORE HEAT




# AN IDEAL GAS BOILER *for* EVERY *heating need!*

*For cottages or bungalows—with or without basements—an Ideal Arcola Gas Heater!*

*For small or medium-sized homes —Ideal 1G Gas Boiler!*

*For larger homes and buildings— Ideal 4G Gas Boiler!*

*For office buildings, big apartment houses, hotels — Ideal 4G Gas Boilers in multiple units!*

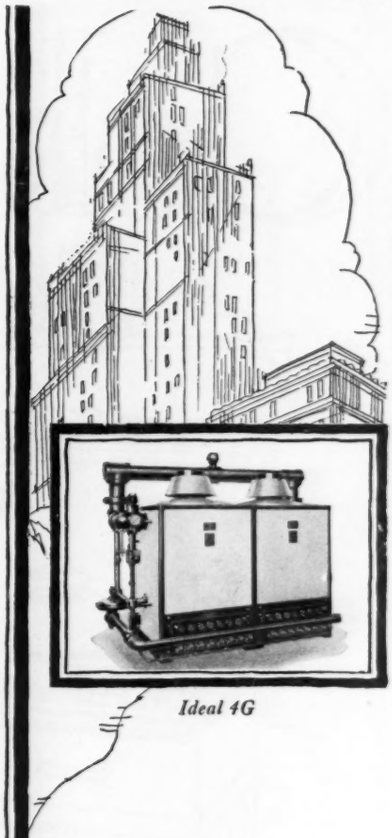
*All these boilers are useful for large-volume hot-water supply and industrial applications.*

THIS whole family of perfectly-designed gas boilers offers you *exactly* the right heating plant for *every* job on which you want to figure.

Designed and manufactured by the American Radiator Company, it is the latest triumph of their boiler engineers.

Ideal Gas Boilers are made available to you without delay by strategically-located distribution centers.

We have prepared for you a plan book covering every detail of selling plans that actually *work*. Won't you send for this complete and practical information?




# IDEAL GAS BOILERS

*Product of* AMERICAN RADIATOR COMPANY *Gas Utilization Dept.*

*Write to* AMERICAN GAS PRODUCTS CORPORATION, *Distributors*

376 Lafayette Street, New York City

# Color

## Not *over*-done...not *under*-done...but *done just right!*

*Snow-white enamel trimmed in your choice of tasteful colors*

# TINTED TAPPAN GAS RANGES

Before bringing out the Tappan color ranges, we studied the color idea from every angle. Two things impressed us. They were:

1. The value of supplying color in such a way that the merchant could satisfy every demand without carrying a burdensome range stock.

2. The importance of selecting colors not only beautiful, but *harmonious in the kitchen.*

The Tinted Tappan Ranges unmistakably express the thought and care put into Tappan color selection. No gaudy hues—*but well-chosen tints!*

Tappan tints are *confined to the trims.* Color pieces are interchangeable. With a moderate stock you can satisfy the color preference of every customer.

The Tinted Tappan Ranges, and our merchandising plans, assure you utmost profit from the color-in-the-kitchen idea.

Write for particulars.

THE TAPPAN STOVE COMPANY, Mansfield, Ohio

*The* TAPPAN
## INSULATED RANGE
***will build bigger summer sales for you***

Sell the idea of *kitchen comfort* with the Tappan In-So-Top Gas Range! It gives the housewife a *real reason* for wanting a new range—NOW! A cool kitchen invites increased home cookery, too—which means higher meter readings. *Insulation* keeps heat *in* the oven and *out of* the kitchen. Tappan In-So-Top may be had with color trims.

FACTORY REPRESENTATIVES:
H. R. Basford Co.,
665 Howard St., San Francisco
H. R. Mayer,
1001 E. First St., Los Angeles
W. D. Ginnaven,
212 Puyallup Ave., Tacoma

# WESTERN GAS

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Dallas, Texas
Phone 2-8708

447 Sutter Street
San Francisco, Calif.
Phone GArfield 2772

Publication Office, 124 West Fourth Street
Los Angeles, Calif. Telephone TUcker 8982


## *Contents for June*


Limiting Factors for Natural Gas Projects ..... 19
*By P. MacDonald Biddison*

Denver Bakers Prefer Gas ..... 22
*By Robert H. Taylor and William M. Gaylord*

Combatting Corrosion by a New Means ..... 23
*By N. H. Wardale*

Editorial ..... 24

Now We're in the Air ..... 25
*By Ralph J. Phillips*

Pacific Coast Gas Association ..... 26
*Questions and Answers for Vancouver Conference*
Commercial ..... 26
Public Relations ..... 31
Technical ..... 32

This Month's Patents Pertaining to the Industry ..... 35

With the Metermen ..... 36
The Emco Balanced Valve Regulator ..... *By J. H. Hill*
Measurement of Gas to and from a Natural Gasoline Plant ..... *By E. C. Spencer*

Fifth Annual Southwestern Gas Meter Short Course ..... 39

Dallas Meetings Draw Unprecedented Natural Gas Attendance ..... 40
*By Craig Espy*

Natural Gas Gasoline Operations ..... 48

Natural Gasoline Association of America in Annual Convention ..... 53



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CRAIG ESPY
*Mid-Continent Manager*

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No. 112

No. 65

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No. 102

No. 85

# COLOR—

## today's strongest selling appeal, now featured in the

# HUMPHREY RADIANTFIRE

With the ever-mounting vogue for COLOR in the home, Humphrey, always in the fore, has placed a tremendous new selling power in the hands of Radiantfire dealers by creating models in color.

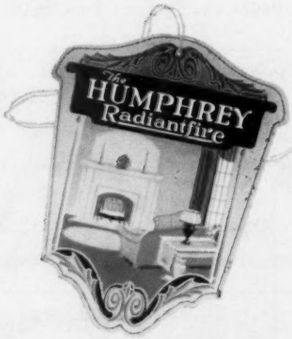
Humphrey Radiantfire is now available in beautiful warm tones that instantly attract. Nothing compares with them. Backed by the known quality of the Radiantfire name, the distinctive new COLORED models will create a large and profitable market for you.

***Write for complete information.***

*Models 20 and 31, now available in Maroon, Green, Walnut Brown and Black.*

*Models 25, 30 and 35 in Electro-Plated Flemish Brass Finish.*

The Humphrey Guarantee and Price tag is a helpful selling feature. Write for a supply.



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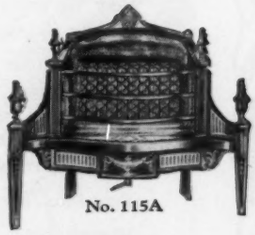
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# *The* HUMPHREY Radiantfire

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**Pacific Coast Manager**
**C. B. Babcock**
**135 Bluxome Street**
**San Francisco**

# WESTERN GAS

**A Monthly Journal of the Gas, Gas Appliance and Natural Gasoline Industries in *Western America***

SAN FRANCISCO LOS ANGELES DALLAS


# Limiting Factors *for* Natural Gas Projects


*By* P. MACDONALD BIDDISON

*Natural Gas Producing Company of Louisiana, Bastrop, Louisiana*


OF THE MANY worth while features which composed the program of the natural gas convention at Dallas, May 7-10, held by the Natural Gas Department, American Gas Association, one of the most discussed was this contribution by Mr. Biddison. In view of the current and unprecedented expansion of the natural gas industry, which is daily bringing new communities within the field of gas service, no topic could be more timely. *Western Gas* will be glad to give space to other material which has for its purpose the reducing of gas transmission projects to an exact science, and the broadcasting of principles already recognized as fundamental.—*Editor.*

THE past four years have witnessed an unusual activity in the natural gas industry, unusual not only in the number of lines completed and projected but in their sizes and lengths and in the consolidation of systems representing large amounts of capital. Concurrent with this development work and consolidation of operating properties, we have seen attempts to promote projects on such grand scales as to startle the imagination and to raise in the minds of many persons familiar with operations and finances of natural gas pipe lines and with the markets proposed to be served doubts as to the integrity of the promoters and of the financial institutions backing them, and the skepticism extents in some cases to the engineers reporting thereon. We have seen also pipe lines of large capacity, both projected and laid into markets aparently already amply supplied with natural gas, as well as into new markets, having back of them gas reserves which on careful analysis are apparently sufficient for but a brief portion of the period required to amortize the pipe line investment. Yet there seems to have been little, if any, difficulty experienced in financing the projects. We have seen promoters who had no gas, no contracts for gas, no money and no financial connections, and no knowledge of the gas business glibly quote rates and secure franchises in communities hundreds of miles from any gas field at rates which we have been accustomed in the past to associate with communities adjacent to natural gas production, in competition with gas producers having both the requisite finances and knowledge and experience in the business, thus creating an expectancy of rates in the public mind that could never be realized and in some cases preventing the materialization of natural gas service to many communities which could have been served had it not been for the activities of a procession of promoters with nothing at stake, who withdrew from the picture when competent analysis showed the absurdity of their proposals.

## WHY THE PROMOTION?

What has brought this avalanche of promotion upon us? Probably many factors contribute to it. I do not recall any failure of a natural gas company in recent years. We have had periods of partial shortage in supply in many regions but the failing supply has in all cases of which I know been fortunately augmented by newly discovered producing areas within reach of the systems. This good fortune has eliminated in the minds of the investing public the old fear of the hazards of the industry and money for new projects has been available at rates nearly as low as for utilities and industries without or nearly without hazard, whose property could be maintained almost in perpetuity, and has enabled financing in some instances on a security retirement period far in excess of the life of the gas supplies in sight. By virtue of the long lives of present operating companies and of reduction in operating costs through consolidations and amalgamations earnings have in general been on so favorable a basis that the public has been eager for natural gas securities and promoters with the assistance of bond houses have utilized this eagerness to the fullest advantage—in some instances with little regard as to what the project might ultimately do for the investor.

Can it be said, however, that because for 10 or 15 years there have been no fatalities among natural gas companies that the hazard which we used to recognize no longer exists? Is one assured of eternal life merely by contemplation of the fact that he yet lives? Are the low interest and amortization rates now current in such financing justifiable because for the past 15 years the natural gas companies have been lucky, and are we justified in forgetting Kansas, northwestern Ohio, and Indiana? What will be the effect upon legitimate projects, with ample reserves, of the failure of some of the recent propositions? The legitimate and safe projects will bear the onus of the failures, with the result

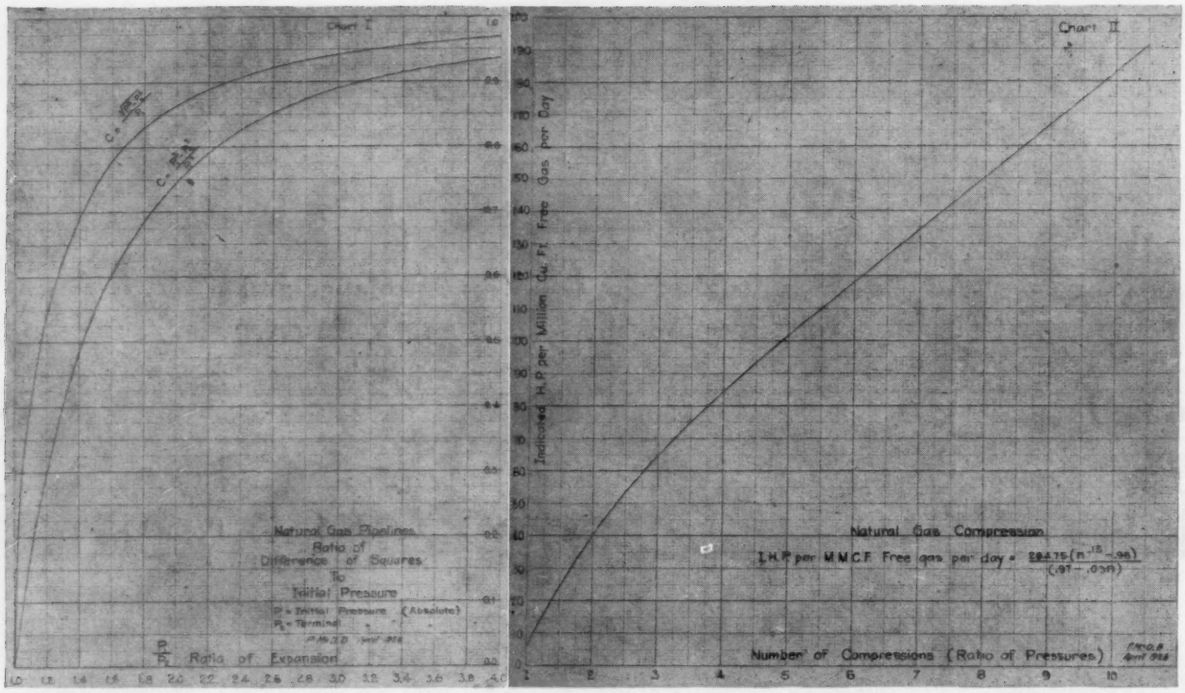


Chart I
Natural Gas Pipelines
Ratio of
Difference of Squares
to
Initial Pressure
P = Initial Pressure (Absolute)
P1 = Terminal
P/P1 Ratio of Expansion
Chart II
Indicated H.P per Million Cu. Ft. Free Gas per Day
Natural Gas Compression
I.H.P per M.M.C.F. Free gas per day = 284.75(n^.15 - .98) / (.97 - .03n)
Number of Compressions (Ratio of Pressures)

of abnormally high interest rates for natural gas projects and greatly increased costs of service to the ultimate consumer.

It is argued that all these projects before financing are passed upon by reputable engineers and the question of reserves passed upon by reputable geologists. However, some of the recent propositions have looked so precarious as to make it appear that possibly the reports had been misused or misquoted or that the technical advisers, though reputable and of recognized ability in many lines of activity, knew little or nothing of natural gas questions. The latter view may well be held when one contemplates estimated sales recently seen in some prospectuses of 100 M.C.F to 150 M.C.F per year per domestic consumer in southern and southwestern communities.

There are some definite limits of possibilities in these projects and it is the purpose of this paper to call attention to some of those possibilities; the data given being such that rule of thumb application may be readily made to any particular project to determine within reasonable limits whether its object is to sell gas or to sell securites.

## ESTIMATION OF SALES

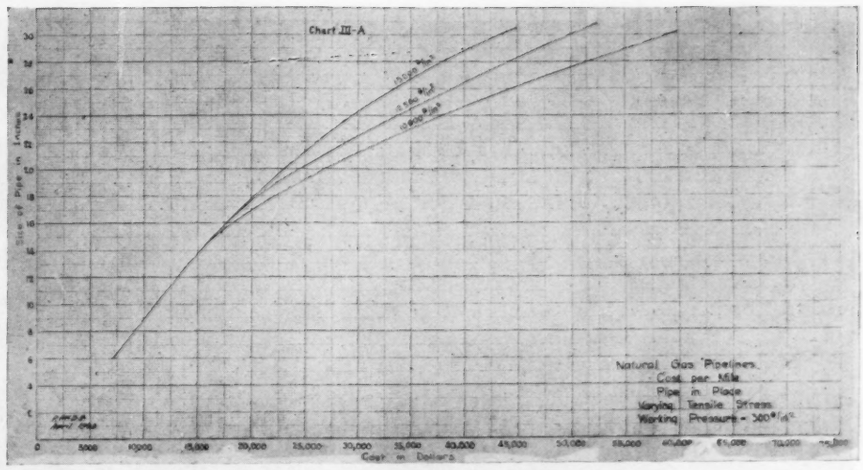
The first place where the promoters seem to go astray is in the estimation of the probable gas sales. They usually assume that all other fuel can be replaced by natural gas. For domestic consumption they assume figures of use borrowed from northern cities and try

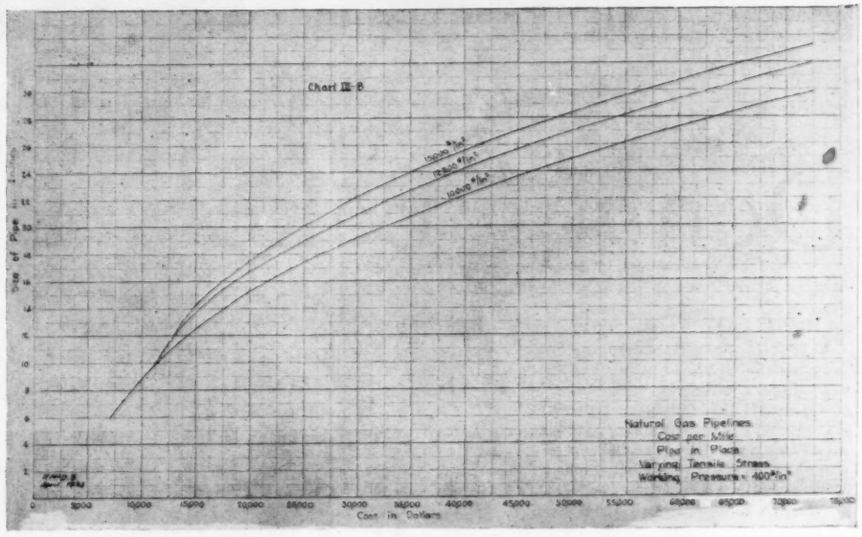
TABLE I APPROXIMATE CAPACITIES OF NATURAL GAS PIPE LINES IN M. C. F. PER 24 HOURS
By Formula of Thos R. Weymouth
Ratio of ABS Pressures 3 to 1—Gas at .60 Sp. Gr., 40°F Flow, 60°F and 15.2 lbs ABS. Sales Base
PIPE SIZE IN INCHES—OUTSIDE DIAMETER

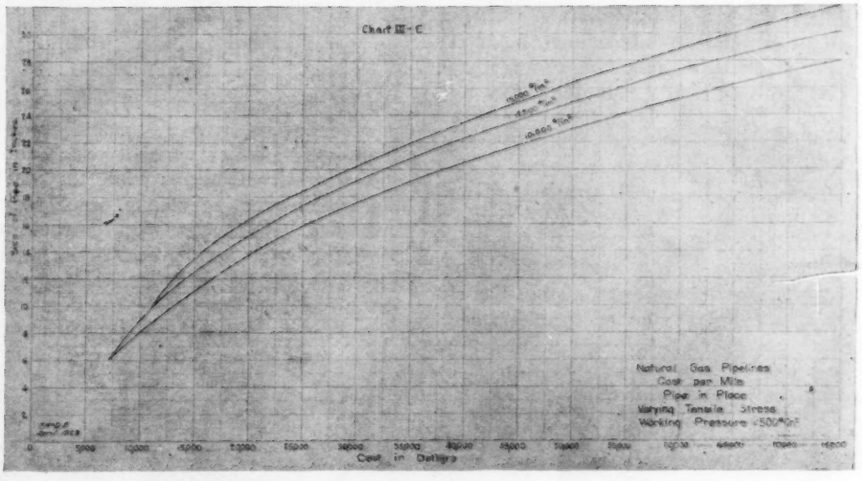
| LENGTH IN MILES | 6⅝ | 8⅝ | 10¾ | 12¾ | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 300 lbs Gauge Inlet | | | | | | | | | | | | | |
| 25 | 6,910 | 14,110 | 25,600 | 41,100 | 53,100 | 75,850 | 103,800 | 137,700 | 176,000 | 223,200 | 274,200 | 333,800 | 403,300 |
| 50 | 4,885 | 9,990 | 18,100 | 29,130 | 37,550 | 53,600 | 73,450 | 97,350 | 124,300 | 158,000 | 194,300 | 235,800 | 285,200 |
| 60 | 4,460 | 9,120 | 16,520 | 26,600 | 34,250 | 49,000 | 67,100 | 88,900 | 113,500 | 144,200 | 177,200 | 215,400 | 260,300 |
| 70 | 4,130 | 8,440 | 15,300 | 24,600 | 31,720 | 45,350 | 62,100 | 82,300 | 105,100 | 133,400 | 164,100 | 199,300 | 241,200 |
| 80 | 3,865 | 7,900 | 14,300 | 23,050 | 29,680 | 42,400 | 58,050 | 77,000 | 98,400 | 124,900 | 153,500 | 186,400 | 225,500 |
| 90 | 3,640 | 7,450 | 13,480 | 21,700 | 27,975 | 39,990 | 54,700 | 72,550 | 92,750 | 117,600 | 144,700 | 175,800 | 212,600 |
| 100 | 3,450 | 7,050 | 12,800 | 20,500 | 26,550 | 37,925 | 51,950 | 68,850 | 88,000 | 111,600 | 137,100 | 166,900 | 201,650 |
| 125 | 3,085 | 6,310 | 11,430 | 18,400 | 23,720 | 33,930 | 46,430 | 61,550 | 78,600 | 100,000 | 122,800 | 149,200 | 180,200 |
| 150 | 2,820 | 5,760 | 10,450 | 16,800 | 21,650 | 30,970 | 42,370 | 56,200 | 71,750 | 91,200 | 112,000 | 136,100 | 164,600 |
| 400 lbs Gauge Inlet | | | | | | | | | | | | | |
| 25 | 9,110 | 18,600 | 33,700 | 53,300 | 68,200 | 96,700 | 134,200 | 176,300 | 228,500 | 287,700 | 356,500 | 433,000 | 516,000 |
| 50 | 6,440 | 13,150 | 23,830 | 37,400 | 48,230 | 68,400 | 94,950 | 124,600 | 161,500 | 203,700 | 252,000 | 306,400 | 365,000 |
| 60 | 5,875 | 12,000 | 21,740 | 34,400 | 44,050 | 62,400 | 86,600 | 113,700 | 147,400 | 186,800 | 230,200 | 279,800 | 333,000 |
| 70 | 5,440 | 11,100 | 20,150 | 31,850 | 40,750 | 57,750 | 80,200 | 105,300 | 136,400 | 172,000 | 213,000 | 258,900 | 308,400 |
| 80 | 5,090 | 10,400 | 18,840 | 29,800 | 38,130 | 54,000 | 75,050 | 98,600 | 127,700 | 160,800 | 199,300 | 242,000 | 288,500 |
| 90 | 4,795 | 9,810 | 17,750 | 28,100 | 35,950 | 50,950 | 70,750 | 93,000 | 120,300 | 151,700 | 187,800 | 228,300 | 272,000 |
| 100 | 4,555 | 9,300 | 16,850 | 26,650 | 34,100 | 48,350 | 67,100 | 88,150 | 114,250 | 143,850 | 178,250 | 216,500 | 258,000 |
| 125 | 4,070 | 8,320 | 15,060 | 23,820 | 30,480 | 43,200 | 60,000 | 78,850 | 102,100 | 128,700 | 159,300 | 193,600 | 230,600 |
| 150 | 3,713 | 7,595 | 13,750 | 21,750 | 27,830 | 39,450 | 54,750 | 72,000 | 93,200 | 117,500 | 145,500 | 176,800 | 210,400 |
| 500 lbs Gauge Inlet | | | | | | | | | | | | | |
| 25 | 11,280 | 22,600 | 40,460 | 64,400 | 82,600 | 117,000 | 161,600 | 213,000 | 279,300 | 349,500 | 426,700 | 514,000 | 630,000 |
| 50 | 7,975 | 15,990 | 28,600 | 45,550 | 58,400 | 82,700 | 114,200 | 150,800 | 197,500 | 247,200 | 301,700 | 363,500 | 446,000 |
| 60 | 7,285 | 14,600 | 26,100 | 41,600 | 53,350 | 75,500 | 104,250 | 137,600 | 180,200 | 225,800 | 275,500 | 331,800 | 406,700 |
| 70 | 6,740 | 13,500 | 24,170 | 38,470 | 49,350 | 69,950 | 96,600 | 127,400 | 167,000 | 209,000 | 255,000 | 307,300 | 377,000 |
| 80 | 6,310 | 12,640 | 22,610 | 36,000 | 46,150 | 65,450 | 90,350 | 119,200 | 156,200 | 195,300 | 238,500 | 287,300 | 352,300 |
| 90 | 5,945 | 11,920 | 21,320 | 33,950 | 43,500 | 61,650 | 85,150 | 112,300 | 147,200 | 184,200 | 224,800 | 271,000 | 332,200 |
| 100 | 5,640 | 11,300 | 20,230 | 32,200 | 41,300 | 58,500 | 80,800 | 106,500 | 139,650 | 174,750 | 213,350 | 257,000 | 315,000 |
| 125 | 5,042 | 10,100 | 18,070 | 28,780 | 36,930 | 52,350 | 72,250 | 95,350 | 124,800 | 156,200 | 190,600 | 229,700 | 282,000 |
| 150 | 4,603 | 9,230 | 16,500 | 26,400 | 33,700 | 47,750 | 65,950 | 87,000 | 113,900 | 147,600 | 174,100 | 209,700 | 257,300 |

to apply them indiscriminately with little if any regard to climatic conditions or the effect of retail domestic prices upon the extent of its use. For industrial service little if any consideration is given to the effect of the manner of use of the present fuel upon the rates obtainable for natural gas in competition with it. For domestic use in southern and southwestern communities experience shows that sales of about 24 M.C.F. to 27 M.C.F. per year may be realized for cooking and water heating, practically replacing the ordinary uses of manufactured gas on a 70 per cent basis. This business can be had almost independently of rates and its volume is almost but not quite independent of climate. The domestic heating load is, however, dependent upon both the climate and the rates for the commodity. At rates but slightly above the cost of competitive fuels nearly the whole of the domestic house heating is obtainable and its volume then becomes a function of the climate. It can be closely estimated under such conditions at 16 cubic feet per customer per degree day deficiency below 65° F. and data on the degree day deficiency are obtainable from Climatological Reports of U. S. Weather Bureau. The peak load of such business may amount to over 40 feet per meter per hour. For any minimum daily temperature the peak space heating load per day will amount to 16 feet per meter per degree deficiency below 65°. Thus for a 25 degree day a peak of 480 cubic feet per day may be expected for heating. The cooking and water heating superimposed on this, with allowance for the larger quantities used for such purposes in cold weather will make peaks for such a temperature on domestic gas about 555 feet per day per meter. [1]If rates for natural gas will be high compared to the fuels it replaces, only a portion of the domestic heating may be obtained and the percentage that may be obtained is dependent upon the class of fuel to be replaced, its method of use and the character of homes. An estimate on this point is difficult and probably amounts to little more than an intelligent guess.

On the basis of a 25 degree minimum mean daily temperature, peak load of 555 feet per meter per day, 100 per cent house heating and a degree day deficiency per year of 1,000, the sales per meter would be about 16 M.C.F. per year for heating, 25 M.C.F. for cooking and hot water heating, 41 M.C.F. total, giving a load factor of 20.25 per cent on domestic business. If the degree day deficiency be 2,000 per year then the heating sales become 32 M.C.F. per year and total sales 57 M.C.F. per year and load factor for a 25 degree minimum day locality becomes 28.1 per cent. Near these limits are the load factors obtainable in southern and southwestern territory on domestic business.




The promoter is apt to give due consideration to the unaccounted for gas in the distributing companies mains in setting up his market, but prone to overlook it in making his allowances for the necessary revenues to the distributing company. Such losses will vary greatly both in percentage of sales and in cubic feet per mile of 3-inch main equivalent. They will seldom, however, be less than 15 per cent of the domestic business and will not ordinarily be varied greatly by changes in volume of industrial sales. They are thus actually a charge against

*(Continued on Page 42)*

1 Acknowledgement is due to R M Redding of the Dallas Gas Company for a very complete analysis of the characteristics of domestic loads in several southern cities

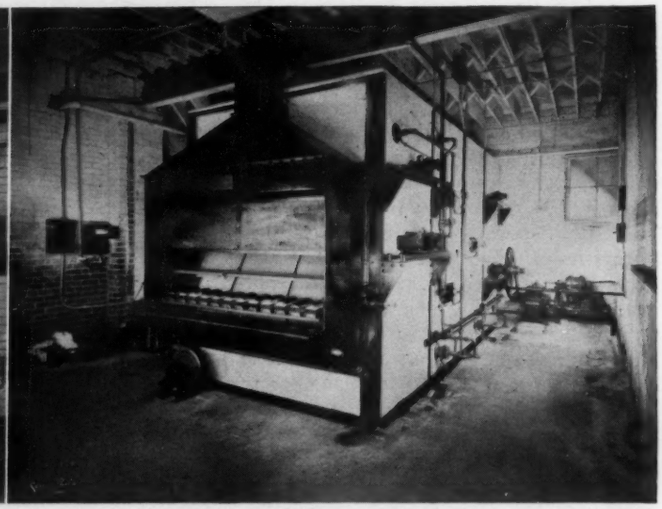


*Figure 1*
*At the left is a view of ovens in a Denver bakery, converted from solid fuel to gas.*

*Figure 2*
*A traveling oven especially designed for gas fuel is shown at the right*

# Denver Bakers Prefer Gas

*By* ROBERT H. TAYLOR
*and*
WILLIAM M. GAYLORD

ARTIFICIAL gas from the mains of the Public Service Company of Colorado supplies the needs of a big majority of Denver's larger bakeries, and some of the particulars of these bakery installations are given in the present article. Robert H. Taylor is engineeer of gas utilization for the gas company named above, and his collaborator, William M. Gaylord, is associated with the company's new business department.—*Editor.*

IN the bakery business the value of cleanliness is self-evident. Master bakers throughout this country have ever been anxious to eliminate dirt and dust. They have been foremost exponents of the slogan "Pure Products Pay."

So it is only logical that gas should be the popular fuel with the bakers, and this is the case in Denver. The elimination of the dust and ashes from coal or coke, the case of application and the accuracy of temperature control, the elimination of fuel storage space—each of these reasons has done its share to put gas-fired ovens in nearly every large bakery in the Colorado capital.

The larger bakeries in Denver which are using gas may be divided into two classes, one including those where oven equipment originally designed to burn solid fuel, has been converted to gas firing, the other comprising installations using gas-designed equipment. Figure 1 shows some of the converted ovens in one large bakery. In each case, the conversion equipment consists of throat type atmospheric mixers, firing through a hollow tile placed in the front end of the combustion chamber, capable of supplying gas at the rate of 270,000 B.t.u. per hour for capacity operation. The ovens having double fire boxes have double burners, each slightly smaller than the ones used with the single fire box ovens. Both types are shown in the photograph. Installed early in 1924, this equipment has operated continuously since that time and has been very satisfactory. In addition to the ovens illustrated, gas is used in other ovens, two 27-section gas-designed steam boilers, one of which supplies steam to all ovens, while the other handles the heating of the proof room and office. Hot water requirements are cared for by an automatically-controlled gas-fired hot water boiler. Doughnut fryers and bread wrapping machines are heated by gas, the latter being of enough interest to warrant a brief description.

### SEALING THE WRAPPERS

These machines receive the fresh loaves of bread and wrap them in a specially prepared paraffined paper. In the next operation, the ends of the wrapping paper are accurately folded. The sealing of the wrapper is done next by passing the wrapped loaves between two plates, each heated by small bunsen type gas burners. The heat from the plates warms the paraffin enough to cause it to flow together between the folded ends. The loaves next pass to a conveyor, so arranged that a pair of endless belts press the folded ends of the wrapping and hold them in place until the paraffin has cooled and the seal is completed.

One interesting installation, a traveling oven especially designed for gas firing, is shown in Figure 2. When the bakery now using this oven was contemplating additional equipment, the question of floor space was considered to be the controlling factor. It was necessary to design the oven to fit the location and several interesting means were used to procure the desired capacity. The travelers or shelves which carry the bread swing from endless chains, one on each side of the oven. These chains pass over sprockets, so spaced that the travel of the bread from the charging door is up to the top of the oven, where sprockets change the travel to horizontal. When the rear of the oven is reached, the chains pass over a second set of sprockets, return to the front to another sprocket set. Two more horizontal passes and the chains then carry the travelers back to the charging door. As can be seen from the photograph, the rear lower sprockets drive the chains, the power being supplied from a three-horsepower motor, through a variable speed mechanism and worm reduction gear. The usual speed is such that 30 minutes are required for a complete cycle through the oven, but the possible range is from 15 minutes to one hour. In using this oven for bread, the steaming is done as the bread travels along the first half of the upper pass. By an ingenious ar-

*(Continued on Page 46)*

# Combating Corrosion *by a* New Means

*By* N. H. WARDALE

*Assistant Superintendent Production*
*Portland Gas & Coke Company*

CORROSION of steel apparatus such as scrubbers, purifiers, and wash boxes, particularly on the interior surfaces where painting is difficult to maintain, represents a very heavy loss to the gas industry. In plants using salt water for gas cooling and scrubbing this corrosion is considerably greater than where fresh water is available.

The use of such processes as galvanizing or sherardizing is usually limited to the smaller pieces of apparatus and cannot be applied to large apparatus after erection. Methods of applying non-ferrous metals to steel have been the subject of much research and it was Dr. Schoop, a Swiss scientist, who developed a practical process of atomizing and spraying metals so that they would bond firmly to surfaces to be protected and coatings of any desired thickness could be applied.

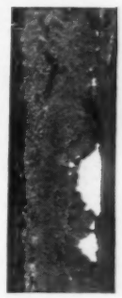
While the process is not new, having been discovered some ten years ago, it is only comparatively recently that it has been introduced on a commercial scale in the United States.

### HOW APPARATUS WORKS

The apparatus, as will be seen in the illustration, is somewhat similar in appearance to a paint spray gun. It consists of an oxy-acetylene burner with a small compressed air driven turbine which is arranged to feed the metal, in the form of wire, into the flame. A blast of compressed air issues from an orifice around the burner and atomizes the molten metal, projecting the particles at a velocity of approximately 3000 feet per second onto the surface to be coated.

Before applying the metal, surfaces should be sandblasted to remove all scale, rust or other foreign matter and to present a roughened surface to which the coating will adhere. The Metalayer is held with the nozzle from three to four inches from the surface to be coated and is moved back and forth over this surface; a single pass will deposit a coating about .001 inches thick. A thickness of approximately .004 inches is generally considered heavy enough for all ordinary protective purposes.

A supply of metal wire of the proper gauge is essential for satisfactory operation. Metals of varying melting points are of different gauges and are fed into the Metalayer at varying rates. The wire must be uniform in thickness and free from kinks. It is preferably wound on spools. The compressed air must be of uniform pressure, about 50 pounds per square inch, and must be dry and clean. The surface to be coated must be sandblasted just prior to application of coating. A slight film of rust forms on steel, especially in cool damp weather, in a few hours and will prevent the coating from bonding properly. Oxygen and acetylene are used from standard cylinders equipped with regulators as used for welding.



*ABOVE: Section of cone bottom of scrubber in service less than two years. Protection with a lead coating is expected to stop this corrosion.*

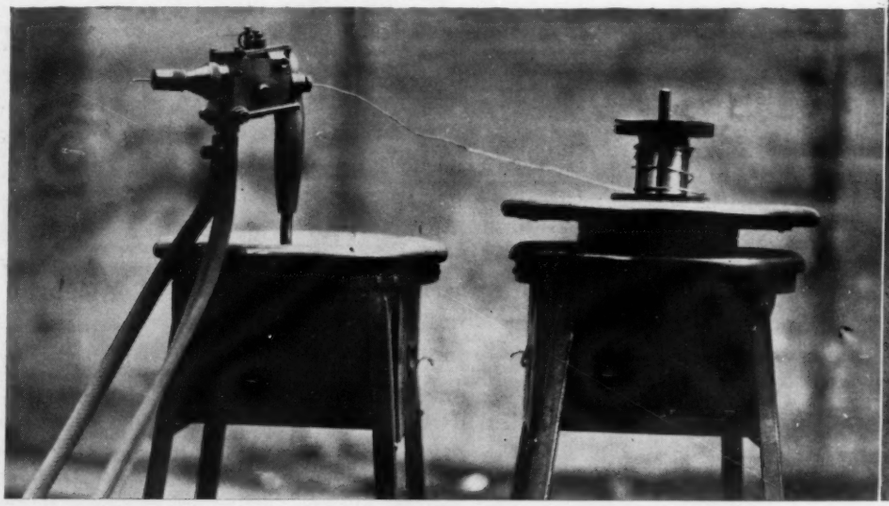
*RIGHT: Tray support beam after 10 years service in oxide purifier. The web is entirely corroded through in places.*

### METAL IS COLD, YET IT ADHERES

The peculiarity of the process is that the atomized metal is practically cold by the time it strikes the surface. It is in fact possible to apply lead coatings to matches without igniting them. The high velocity is the cause of the adher-

*(Continued on Page 51)*

*Below: Metalayer with wire ready for operation. Right: Workman illustrating use of Metalayer.*



# EDITORIAL

### *Open Forum*

CONSIDERABLE space has been allotted in this issue of *Western Gas* to some practical material compiled in preparation for the June 6-7 regional conference of the Pacific Coast Gas Association at Vancouver, B. C. This feature, found on Pages 26 to 34, is a series of 15 questions turned into Association headquarters by gas men of the Northwest, with numerous replies from individual members of the Association whose experiences touch the subjects covered by the questions. The result is an open forum of practical opinion on such topics as competition from electric water heaters and ranges, trade-in allowances on used appliances, operation of a small coal gas plant, de-tarring of gas, gas plant smoke, high bill complaints, and numerous others.

Readers are recommended to turn to this "question and answer section", whether or not they live in P. C. G. A. territory. A wide variety of gas service conditions is reflected in the replies to the queries.

Incidentally, the number of answers secured by P. C. G. A. headquarters from circulating these questions is a good index to the interest taken by members in the activities of the organization. Due to space limitations it has been necessary to omit many of the replies.

---

### *A Competitor's Opinion*

IT will come as something of a shock to gas utility men who are concerned with the possibilities and limitations which surround their service to the public to read the following quotation from a petroleum company executive who spoke before the recent annual convention of the American Oil Burner Association. Said the oil man:

"Due to difficulties both as to distribution and price, there is good reason to believe that with aggressive advertising and cooperation between the oil burner manufacturer and the oil industry, oil will win complete leadership in the home field before gas can become a serious competitor."

This is a dreary prospect indeed. Our lusty infant home heating load lifted from us over night, with no account taken for any objection we may raise! It seems no less than fair to give the gas man a word, and F. C. Hoffman, sales manager of the Northern States Power Company, St. Paul, Minn., covers the situation nicely in a recent paper on gas heating. Says the gas man (and he speaks from experience in selling manufactured gas for home heating):

"Virtually every oil burner user is eventually a gas heating prospect. He is being given a taste of living at greater ease. The trend of cost of oil is not down. His equipment is not so simple as the gas heater and, therefore, requires more attention as time goes on. Gas heating is the simplest and most satisfactory type of automatic heating at present. The cost of equipment compares favorably with oil burning equipment of the better type."

Evidently there are two opinions on where the selling advantage rests as between gas and oil. To give the competitor his due, the oil burner man has been going after the nation's heating load more ambitiously the past two years than ever before, particularly through the recently formed Oil Heating Institute. The Institute's educational campaign to which several petroleum companies contribute is planned two years ahead, with special direction toward home owners, architects and builders. The oil burner salesman, too, has developed a technique which the gas heating salesman in many cases needs to follow. He sells a superior service, comfort, freedom from labor, and keeps the cost of equipment in the background where it belongs.

Gas companies which have yet to get in motion on developing a real house heating load should not take Mr. Hoffman's remarks to mean that they can let the oil burner pioneer their way. Everyone admits the difficulty of selling a load which the other fellow already holds.

---

### *Coronado in September*

VACATION season has arrived again, and once more there is an opportunity for those within the scope of Pacific Coast Gas Association territory to include the benefits and pleasures of the annual convention on their itinerary. No more ideal spot than Coronado, California, could be imagined—for a convention or for a vacation. Plan that two or three-week holiday with the Thirty-fifth P. C. G. A. Convention, beginning September 17, in mind. These annual conferences draw attendance from all over the west on the strength of the excellence of the convention program. This year's program will be no exception, and those who miss it are the losers.

# *Now* We're *in the AIR*

## Gas Fuel Serves the Aircraft Industry

*By* RALPH J. PHILLIPS

*Gas Sales Engineer*
*San Diego Consolidated Gas and Electric Company*

*Duralumin, heat treated in gas-fired hardening furnaces, covers the entire framework of fusilage, wings, wing spares, alerions and tail assembly of this All Metal Tri-Motor Monoplane, manufactured by the Pruden San Diego Airplane Company*

WITH apologies to Wallace Beery and Raymond Hatton it may be said of San Diego, California, that "Now We're in the Air."

Since Colonel Lindberg's famous flight from San Diego to Paris commercial aviation has come rapidly to the front. For many years it has been recognized that the climatic conditions of Southern Californa are ideal for aviation, and it was for this reason that the United States Government established in San Diego, Rockwell Field for the army air forces and the Naval Air Station.

*R. J. Phillips*

In keeping with the progress of aviation the City of San Diego voted a bond issue of $650,000 to build a municipal air port. This work is now under way and by 1929 it will be in operation.

This project not only provides facilities for land and sea planes, but also sets aside a large tract of land to be used for aircraft industries which are now undergoing rapid expansion.

The pioneer manufacturers, The B. F. Mahoney Aircraft Corporation, successors to the Ryan Aircraft Company, and builders of the Spirit of St. Louis, have grown from a small factory producing one plane in several weeks, to a large organization turning out about 17 planes per month.

The latest development in aircraft construction is in the use of the alloy duralumin for all metal planes, and such planes are now being manufactured in San Diego by the Prudden San Diego All Metal Airplane Company.

Where accuracy of temperature control is so vital as in the heat treatment of duralumin for aircraft manufacture gas fuel has proved to be indispensable.

Not only does it answer this requirement but also from many other standpoints it is the ideal fuel. Next in importance to ease and accuracy of temperature control is the economy of operation. After nine months' use at the Prudden plant the total cost of operation was found to be far lower than could be attained with any other fuel.

Reliability is the next factor to be considered when choosing a fuel for this particular purpose. During the period mentioned above there has never been a delay which can be traced directly or indirectly to the fuel itself.

Safety is the third essential factor in the use of industrial fuel. No furnace which is not absolutely free from fire and explosion hazard should be considered in a modern industrial establishment. Properly designed equipment using gas fuel entirely eliminates these dangers.

Besides these above-mentioned factors, gas fuel offers numerous other advan-

*(Continued on Page 56)*

DATA ON DURALUMIN HEAT TREATING

Gas Equipment used: Circular pot furnace.
Description and size: Pot diameter 16 inches; pot depth 18 inches at center, 16 inches at side.
Combustion chamber: Diameter 27 inches; height 20 inches.
Over all dimensions of furnace: Diameter 42 inches; height 33 inches to top of pot.
Combustion system: Proportional Mixer; Centrifugal blower; ⅓ H. P. motor.
When installed: May, 1927.
Refractories: (Thickness and kind) 4½ inch Fire Brick.
Insulation: (Thickness and kind) 2½ inch Sil-O-Cel.
Method of venting appliances: 6-inch diameter vent at lower side of combustion chamber to atmosphere.
Temperature control: Potentiometer Controller and By-pass control valve.
Working temperature: 917° Fahr. to 923° Fahr.
Time to complete operation: 20 minutes.
Time to reach desired temperature: (a) From cold start—2 hours; (b) From warm start—1 hour.
Note: Temperature held at 550 to 600 degrees over night with atmospheric burner.
Cubic feet of gas per hour: (a) Burners full on—233 cu. ft.; (b) Holding cons.—90 cu. ft.
Previous source of heat: None. Gas used from start.
B.t.u. value of gas: 550.
Cubic feet of gas per month: 55,000 average.
Brief description of process: Sheet duralumin, duralumin rivets, etc., placed in hot salt 50 per cent Na $NO_2$ 50 per cent $KNO_3$ bath for 20 minutes, after which it is immediately quenched in cold water and then shaped. After about one hour it begins to harden and at the end of four days reaches maximum hardness.

# PACIFIC COAST GAS ASSOCIATION

447 Sutter Street, San Francisco, California

A Department Conducted by Clifford Johnstone, Executive Secretary

## *Who's Who on the 1928 Convention Committee*

WITH the Pacific Coast Gas Association Convention scheduled to open at the Hotel Del Coronado September 17th, the General Convention Committee, with C. D. Weiss as chairman, has adopted a program of pre-convention publicity to urge members of the Association to spend their vacations in and about San Diego. In carrying out this program the committee has the cooperation of the San Diego Chamber of Commerce and the daily newspapers.

Tentative plans have been discussed at two meetings of this general committee, the personnel of which includes:

C. D. Weiss.....General Convention Chairman
W. A. Lambert.....Hotel Accommodations
Alfred May.....Registration
W. E. Frazier.....Transportation
R. C. Cavell.....Entertainment
W. M. Thompson.....Golf
D. L. Scott.....Luncheons
Wm. DeWaard.....Banquet
F. M. Raymond.....Publicity
D. H. Perkins.....Exhibits
Ruth Crevelling.....Convention Magazine
Mrs. L. M. Klauber.....Women's Entertainment

Highlights of the Convention will include a speaking contest, an advertising exhibit and an industrial display, featuring mechanical specialties of interest to the gas industry, as well as the latest gas appliances. The management of the Hotel Del Coronado is anxious that the Convention be a decided success and is cooperating to the fullest degree to the end that all Convention guests will enjoy their sojourn in this historic and romantic hostelry.

## *Northern Gas Men Gather in Vancouver, June 6 and 7*

AS this number of *Western Gas* goes to press all good gas men are turning their eyes to the far north where the Northern Regional Conference of the Association convenes on June 6th and 7th, to enjoy the hospitality of our Canadian friends for the first time since 1922. While we will have more to say about this conference in the July number, there is every evidence now that it will establish a Northern record both in attendance and interest.

Perhaps the most novel feature on the program is the *Question Box*. The questions were all submitted by northern Association members and have been circulated widely in quest of authoritative answers. Many written replies were received by the Secretary and as these are of interest to all gas men, they are published in the following pages. They are well worth the effort of a careful reading, for they reflect practical experiences of those who have given thought to framing the answers.

*Grouse Mountain Chalet, which will be the objective of a scenic drive for Vancouver Conference delegates Thursday afternoon, June 7*

## *Questions to be Asked at Northern Regional Conference —and a Few of the Answers*

### COMMERCIAL

**1. Northwest Gas Sales Council?**

*Would the organization of a Northwest Gas Sales Council be helpful to the Sales Departments of gas companies in the Northwest? What are the advantages and objections to such an association and how could it tie in with the Commercial Section of the P. C. G. A.*

**Answers**

We have found that the holding of Regional Sales Conferences permits more specific discussions of sales questions than is true at a larger meeting attended by representatives from territories where conditions differ materially. We have not found it necessary or desirable to form Regional Associations for this purpose, but instead arrange for the appointment of a commercial section committee from the territory in question to arrange for the conference and call this committee the Regional Gas Sales Council.

*A. G. A. Commercial Section.*

Our objection is that on account of the enormous distances it is hard enough now to get together at the Conferences; to add to the dilemma would be inadvisable.

*Portland Gas & Coke Company.*

The Pacific Coast Gas Association has in the past few years developed a Commercial Section. This section has produced wonderful results for the companies that are members of this Association. Therefore, I believe that branch organizations would not produce the results that we should be able to obtain by putting our best efforts into the Commercial Section of our Association.

*J. C. Gilbert, Dist. Supt. Southern Counties Gas Co., Santa Monica.*

Judging from the manner of organization of other industries and sales promotional organizations having a coast-wide scope such as ours, it would seem that a Northwest Gas Sales Council, acting as a sectional division of the Commercial Section of the P. C. G. A., would be helpful to the Sales Departments of the gas companies in the Northwest. The advantages would of course be their ability to meet more readily and in greater numbers and discuss subjects which are characteristic of their particular territory such as the extraordinarily low rate for electricity and the problem of meeting such a condition with gas sales. Such an organization could tie in with the Commercial Section of the P. C. G. A. as a sectional division. And occasionally regional meetings of the whole Pacific Coast could and should be held in the Northwest.

*Lew Galbraith, Division Sales Mgr. Pacific Gas & Electric Co., Oakland*

**2. Range Campaigns?**

*What success has been met with in the Spring gas range campaigns? Give details of methods used, mentioning especially any novel features.*

**Answers**

Our national Gas Range Week has been a big success every year until this year when we found that in spite of all efforts, it was very difficult to get anywhere. Whether this was due to people being over-bought and having their future mortgaged clear up to the hilt, or whether the apathy is caused by general depression and the psychological effect of the large number of people out of employment, is hard to tell.

We get together with the dealers each year and lay our plans. All of us make special window displays. We furnish the posters for the windows, printed in red, white and blue on account of it being a national affair. Personally I handle the publicity for gas and gas cooking, and of course the gas company has to stand the greater part of the advertising expense which is necessary in order to get the free publicity.

Last year we gave away the oven heat control. The year before we gave $5.00 off. This year they all felt that we ought to stop giving things away and should use some of the money thus saved in more advertising. It may be that this decision was in part to blame for the lack of demand.

*John H. Hartog, Sales Manager*
*Portland Gas & Coke Company*

Last year in San Francisco, the range people did more business than any other Spring campaign and were highly pleased with the results accomplished We had two windows at the Pacific Gas & Electric Company's offices at 445 Sutter Street, one of which displayed the modern range and the other displayed a trick water faucet where water continuously flowed without any apparent source of supply. The principal feature of the week was the giving away of a thermostatic control with each range selling for $118.00 or over.

We also had a menu contest featuring the preparation of a meal for four people, not to exceed $2.00 in cost. A large number of replies were received and 10 prizes were given away in this contest.

*Ray Trowbridge, Industrial Gas Engr.*
*Pacific Gas & Electric Co., San Francisco*

We have had no experience with the active Spring campaign on gas ranges. Our advertising is continuous, except when we have special sales to clear our stock of obsolete models or reductions of stock prior to a change of model. It is our policy to keep gas appliances continuously before the public and our floor displays are arranged accordingly. We have recently done some very splendid advertising on colored ranges which has produced results. It is our policy to enter all exhibits through Women's Clubs and other organizations and we have just completed two exhibits on gas ranges, gas refrigeration and water heating, which proved to be very effective. In connection with these exhibits, we tie in our Home Service Department and serve coffee with cookies or other food which is easy to prepare for an occasion of this kind.

*J. C. Gilbert, Dist. Supt.*
*Southern Counties Gas Co., Santa Monica.*

Our climate is such that many of our customers leave in the spring of the year and because of this fact, the sales on higher priced ranges are reduced to a considerable extent. We concentrate on small apartment house ranges and ranges for smaller homes.

During August, 1927, we conducted a campaign on Reliable ranges selling for $34.50 and as a result we sold 98, which was exceptionally good. In other words, we concentrated on the cheaper ranges during the spring and summer months and campaigned the higher priced ranges beginning September; we have found this plan to be very successful. In September, following the August, 1927, campaign, we conducted a special campaign on higher priced ranges which resulted in the sale of 135.

*A. F. Morairty, Ass't. Gen'l. Mgr.*
*Central Ariz. Lt. & Pr. Co., Phoenix*

**3. Water Heating.**

*Is the electric water heater a serious competitor even at lower rates? Are users satisfied with them and to what extent do they give satisfactory hot water service?*

*Does the low-consumption gas water heater meet this competition successfully? Does it give satisfactory service and is it a load builder? Let us have details.*

**Answers**

Electric competition is rather a misnomer when it comes to waterheating because competition somehow infers a contest between merchants. Where one tries to sell and the other virtually gives stuff away, you can hardly call that competition, as in our case where the electric people allow a person to use all the hot water he needs at a ridiculous flat price of $2.65 a month. A friend of mine received his first bill for $10.00. Of course he went up in the air and made a beeline for the electric headquarters where profuse apology was offered him, saying that it was a mistake to have the waterheater on the meter as it was to be charged on a flat rate.

This rate of $2.65 per month is in connection with an electric range. If you don't have the range, it costs you $3.75 per month. This is for a 40-gallon tank consuming 750 watts and costing $62.25 installed complete.

This situation made it impossible to sell any automatic gas water heaters, but in our 1927 house-to-house canvass, we made a special point to find out whether electric water heating customers were satisfied or not. Out of a total of 918 families where the water was heated electrically, we found 815 satisfied and 113 dissatisfied.

This percentage of dissatisfied customers was sufficient to change our opinion in regard to the futility of pushing automatic waterheaters, and as a result of the information secured, we started this Spring advertising the wonderful comfort and the benefit to one's health and happiness of "hot water on tap" and "incidentally" mentioned the new water heater which we are featuring.

Out of the total families visited in our 1927 canvass, the number who used gas water heaters (which means almost entirely tankheaters) amounted to 70 per cent and those using electric waterheaters amounted to about 7 per cent.

*John H. Hartog, Sales Manager*
*Portland Gas & Coke Company*

I do not consider the electric waterheater a serious competitor of gas water heating at the present rates given for electric water heating. Electric water heaters give very satisfactory service, in fact as satisfactory as the gas heater, outside of the cost of operation. Most users are satisfied with electric water heaters when the cost of operation is not a matter for consideration.

*A. E. Holloway, Supt. of Commercial Dept.*
*San Diego Cons. Gas & Electric Co.*

Electrict water heating is becoming a more serious competitor as lower rates are made effective. Users are universally satisfied with them and they give satisfactory service to the extent that they are properly and adequately installed. The low consumption gas water heater meets the competition providing the selling effort is put forth in the proper manner. It does give satisfactory service and it is a load builder. These heaters are very desirable from the standpoint of the gas company. They are of a type that requires very little servicing thus making them desirable from a consumer standpoint. The fact that the cost of operation is somewhat higher than the instantaneous is not a deterrent in recommending them.

*Lew Galbraith, Division Sales Mgr.*
*Pacific Gas & Electric Co., Oakland*

Our electric water heater sales do not compete with the gas heater sales because we do not have an electric rate effective in the gas district.

In order to take on a satisfactory electric water heating load, it is necessary to limit the Kilowatt demand; this makes the electric water heater slower than the gas water heater.

Our water heater rate for gas is:
$1.80 for the first 2 Mcf.
$1.60 for the next 3 Mcf.
$1.40 for the next 5 Mcf.
$1.20 for the excess

Our electric rates for water heaters and ranges are:
5c for the first 60 KWH
5c for the next 40 KWH
3c for the excess.

*(Note: These electrical rates apply providing a double throw switch is used with the electric water heater and range and provided the water heater is not in excess of three KWH capacity.)*

With the above rates, the gas water heater is very much cheaper than the electric water heater.

*A. F. Morairty, Asst. Gen'l. Mgr.*
*Central Ariz. Lt. & Pr. Co., Phoenix*

**4. Domestic Cooking?**

*What is happening to the domestic cooking load?*

*Can women be persuaded to do more home cooking?*

*Can husbands be induced to demand cooked food instead of a nosebag of horsefeed?*

*How are we to stop the inroads of electric cooking?*

*Are the users of electric ranges satisfied? Do they admit that the ranges are slow? Do they admit that the bills are high?*

*Has any gas company tried the maintenance of a reference library of cook books?*

**Answers**

The domestic cooking load has been slightly reduced for several reasons, among which are the facts that more food can be bought ready cooked and that the efficiency of gas appliances has been increased. It is doubtful if there is any way to change this tendency. In our district, electricity has not been a serious competitor. Some electric ranges are being installed and the users are satisfied. They admit the ranges are slow in some cases. They also admit that the bills are slightly higher than gas.

*A. E. Holloway, Supt. of Commercial Dept.*
*San Diego Cons. Gas & Electric Co.*

We note a very slight loss in cooking load, but our Home Service Representative, Miss Ella Lehr, has undoubtedly stimulated home cooking through a series of weekly articles, entitled "Come into the Kitchen," appearing in the San Jose Mercury-Herald. These articles have resulted in a great number of inquiries from our customers, indicating clearly that they were taking a greater interest in home cooking.

Electric cooking cannot be stopped It is here to stay and grow. The gas cooking load can be held, however, by selling quality gas ranges, featuring the oven heat control, smooth tops, etc. In most cases the users of electric ranges are not only satisfied, but are enthusiastic. The modern electric range with speed units is not slow and there is very little complaint about high bills.

*J. S. C. Ross, Division Sales Mgr.*
*Pacific Gas & Electric Co., San Jose*

Our average residential consumption was on the downward path until about a year ago when our concentrated efforts were rewarded by seeing the line turn up, and this upward trend is still continuing.

This was in some measure due, I believe, to my idea of calling the husbands to arms against being fed like an express horse on the street—out of a nosebag. For many men meekly accept the new system of eating out of a bag or out of a can, without even registering an objection.

During National Gas Range Week we had an opportunity to say what we pleased in the free publicity and this nosebag feature was a novelty and went in without being blue-penciled.

Another thing we endeavored in the write-ups, and that was to coax women to do more cooking by telling them the advantages of having a vessel on the stove at all times as a receptacle for the various things that go to make up soup stock, which most American women throw out. Privately, I may mention that I have been eating soup at home ever since, and while I hate to be a martyr to the cause, nevertheless it is gratifying that the articles made some impression.

Another thing we laid stress upon in the National Gas Range Week publicity was the making of zwieback. As common white bread is more or less of an abomination to me, I could whole-heartedly urge people to slice it thin and put it in the oven until it becomes a beautiful, golden brown. It is really surprising how appetizing it is and how it lends itself to various things, especially to full-cream cheese or even to serve in lieu of croutons in soup.

Here is an amazing feature which is worth every gas man's consideration: If with our 87,500 customers every one could be induced to use the gas only 15 minutes more in the morning and 15 minutes more in the evening, it would mean 10 cu. ft. per customer per day increase, which, with our number of customers would mean 175,600,000 cu. ft. per annum if this increase could be carried on for 200 days in the year. I say 200 days because there are lots of days when one cannot expect this increase to be continued, especially on account of the summer season and vacation time.

As this increase would be seven times what our 1927 increase was for residential consumption, it means that we would only have to persuade one out of every seven women to use the gas 15 minutes more morning and evening and that alone would mean as much increase as our entire 1927 increase.

Other things are: Advertise in winter that the children ought to be sent to school with a warm breakfast; that husbands should be led to realize that their breakfast is the real fuel to start the day with; that milk, the best food of all, may be like lead in the stomach if taken cold, but same article is pleasing and soothing when warm.

There is no way of stopping the inroads of electric cooking, and the only way to offset the attack is to sell the very best gas ranges and see that they are installed and operating satisfactorily.

During our house-to-house canvass conducted during 1927, it ws found that out of almost 15,000 families called upon, nearly 11,000 used gas and 3,314 electricity.

Out of this 3,314 it is noteworthy that 3,153 were satisfied, although 809 or about 40 per cent admitted that electric ranges were slow. On the other hand, only 107 or about 3 per cent were willing to admit that their electric bills were high, showing that it isn't a question of cost of operation and that we need not talk the cheapness of gas but the speed, as eight times as many people admitted that the ranges were slow against those who admitted that it was expensive to cook electrically.

It is interesting to know that two out of every three, or in actual figures, 2,236 out of 3,314, had installed electricity because they didn't know what a modern gas range was and could do. In other words they were prejudiced against gas on account of the unsatisfactory stoves formerly sold those people. Verily, the chickens have come home to roost.

*John H. Hartog, Sales Mgr.*
*Portland Gas & Coke Co.*

The domestic cooking load is drifting to the canneries. There is a considerable encouragement, however, in the fact that with the improved gas ranges and the renewed activity brought about with manufacturers, dealers and gas companies as a result of this drifting away and consequent decrease in domestic consumption, the condition is beginning to have some stimulating effect. If this condition is taken seriously by all concerned and proper effort is put forth to meet the situation, there is no doubt that it can be successfully met.

Women can be persuaded with comprehensive effort to do more home cooking. There is a possibility that it could be made something of vogue in the way of women's affairs if we all get behind it in an expert manner. Once get the women interested in the subject and somewhat in rivalry over the question of home cooking and there is no doubt that it would bring about a rejuvenation of this art that appears at present to be among those lost.

It was a bold man who brought up the query as to whether husbands can be induced to *demand* cooked food instead of a nosebag of horsefeed. It might be necessary to begin at the source and include this matter of home cooked food as part of the marriage ceremony.

The inroads of electric cooking will not be stopped, but they will be hampered by a greatly increased activity on the part of gas cooking. And, furthermore, the present installations wherein the gas range is not satisfactory in the way of being unvented or without the closed top or without oven regulators offer the most vulnerable spot in the domestic gas load for the inroads of electric cooking, and there is only one way of course to fix it and that is to put in new and correct equipment.

Users of electric ranges are generally highly satisfied. They do not admit that the ranges are slow because the modern range is not slow. Nor do they admit that the bills are high because they are not unless they have been extravagant. In making the foregoing statement, it is based upon general electric cooking rates as applied throughout the Pacific Coast.

*Lew Galbraith, Division Sales Mgr.*
*Pacific Gas & Electric Co., Oakland*

The decline in domestic cooking load in our opinion is due to neglect of gas utilities in commercial activity and failure to tell the housewife of economy, speed and control of gas for cooking purposes. However, this is not all of the trouble. Some of the others are high cost of maid service, the improved food and service from restaurants, tea rooms and delicatessens, and the continuous social activities which demand more of the wife's time away from home. Something must be omitted in a program of this kind and cooking is the logical one to be left out, because it eliminates several hours work.

Women can be persuaded to do more home cooking, but we will first have to sell the husband on this idea, because I believe that he is largely responsible and has an erroneous idea in many cases of cooking, thinking it drudgery, instead of a household art.

Home service work has an appeal to the average housewife, and this branch of the gas industry is producing results daily. For example, we have one Home Service Director in a territory served by approximately 30,000 meters. One is not enough for a territory of this size, but this one woman interviews as many as 400 people in a week. After this work has been in progress for a year, there is not a day passes that we do not have many calls for recipes and other requests for assistance in many other household activities; and by continuously placing this before the public, women's clubs, and many other organizations, we are bound to eventually increase our cooking load.

Can husbands be induced to demand coked food instead of a nosebag of horsefeed? Some would prefer the nosebag. But why not appeal to the husband from his physical make-up, his morning grouches, his complaining of indigestion, the deep wrinkles in his face and inability to smile?—All this through publicity. In this manner you might educate the husband to *demand* home cooked food, which we, as good gas men, know will bring back his smile, the cheerful morning greeting, and will also take the lunch counter hump out of his back. This may sound foolish but this same method has been used to induce the women to buy better clothes, to use a certain kind of soap to develop "the skin you love to touch," etc. Why won't it work with the men?

How are we to stop the inroads of electric cooking?

Improved service

Better posted employees

Continuous and uninterrupted supply of gas.

A uniform heating value at a uniform heating pressure.

Regular periodic inspection of consumers' appliances.

Improved gas appliances.

Selling of gas appliances by gas utilities. Direct sales by contact salesmen.

Encourage dealers to handle only A.G.A. appliances and encourage A.G.A. to still raise their standard.

Advertising of all kinds and, above all, SERVICE that is par excellence.

*J. C. Gilbert, Dist. Supt.*
*Southern Counties Gas Co.*
*Santa Monica, California*

CONDITIONS IN PHOENIX

In Phoenix the domestic cooking load is reduced in the summer due to climatic conditions; in the winter, there is no appreciable reduction in the domestic cooking load compared to what it was in former years. It is true that a great many of our winter tourists frequent restaurants and cafeterias, but those who have homes of their own seemingly do as much cooking as formerly. Just what the conditions elsewhere are is difficult to ascertain because due to the fact that there are many health seekers in Phoenix, more attention is probably paid to good food than in other places where the struggle for health is not so strenuous.

The most effective and obvious way in which to induce women to do more home cooking is by educating them to the advantages to be derived by their families from home-cooked, well balanced meals.

Much has already been done in this direction by cooking schools, sponsored by newspapers or by companies selling food products. Public health work in the public schools has also done a great deal toward impressing mothers especially with the necessity of giving their children properly cooked food.

Once women realize fully the supreme importance of food, properly cooked and attractively served, they will be willing to do more home cooking. Making ranges and other kitchen appliances efficient; reasonable in price and attractive in appearance will do much toward contenting the housewife with her work of preparing meals in her own kitchen instead of purchasing prepared dishes at the corner delicatessen store.

Three-fourths of a housewife's working hours are spent in the kitchen; when that kitchen is made an attractive place in which to work; when she has adequate devices for simplifying the drudgery; when she has ample knowledge of simple, wholesome menus—then the average woman will be willing to do more home cooking and will take pride in the work.

Any method, such as well conducted cooking schools, attractive cook books, simple menus, placards showing the benefits to be derived from certain foods and palatable dishes, will help to bring about this condition. The public utility company is one of the organizations best fitted to carry on this work.

One of the conditions that makes for the use of canned foods in the home instead of properly cooked foods, is the large percentage of wives who work all day long. After a day's work in an office the housewife is too tired to plan and prepare a meal. The husband who demands home-cooked foods must provide time and proper equipment for the preparation of tasty meals.

Naturally being an electric and gas company, we do not desire to talk against electric cooking. In fact, electric cooking can equal gas cooking in every way and in the opinion of some people it is superior to gas cooking because of the absence of odors and the increased cleanliness.

Occasionally a customer of ours desires an electric range although he is within the gas district; we show such a customer that this would entail the installing of two services as the gas water heater is very much superior to the electric heater; in this way we have entirely prevented any competition between the electrical cooking and gas cooking within the gas district.

The users of electric ranges are satisfied; an electric range when properly equipped for the service demanded is just as fast as the gas range. This is true if large enough units are used. With the rates quoted above, electric cooking is not more expensive than gas cooking.

*A. F. Morairty, Asst. Gen'l. Mgr. Central Ariz. Lt. & Pr. Co., Phoenix*

### 5. Refrigeration?

*What has been the experience so far in selling and maintaining gas refrigerators? What about operating costs?*

**Answers**

At a recent meeting of the A. G. C. Refrigerating Committee the statement was made that the servicing costs of the gas refrigerator, although not yet stabilized, were substantially below those for electric units.

*A. G. A. Commercial Section*

Our experience to date on gas refrigeration has been very satisfactory. Every consumer seems to be entirely satisfied. We have followed this very carefully, wishing to get the consumer's reaction before outlining a definite advertising campaign on gas refrigeration. We find that the cost of operation is approximately one-half the cost of electric operative units. This includes gas for heating and water for cooling. This comparison is made with 1100 B.t.u. gas at $1.15 per thousand.

*J. C. Gilbert, Dist. Supt. Southern Counties Gas Co., Santa Monica, California*

We are now experimenting with gas refrigeration; we find at the present time that the ice-making capacity of most machines is not sufficient to compete with the electrical refrigerators. However, we are of the opinion that once this deficiency has been corrected and certain mechanical flaws have been rectified, gas refrigeration will be a close competitor with electrical refrigeration. The only sales resistance will be the water cooling. We believe the operating costs of gas refrigeration will be less than those of electrical refrigeration.

*A. F. Morairty, Asst. Gen'l. Mgr. Central Ariz. Lt. & Pr. Co., Phoenix*

### 6. Blue Star Home Plan?

*Is the Blue Star Home Plan the answer to the gas man's prayer?*

*What is the most effective means of introducing it and at the same time enlist full dealer cooperation?*

**Answers**

We believe that the most important duty facing the gas industry is the development and initiation of better gas burning equipment, to teach the public that it pays to buy first class equipment. We also believe that "pride of possession" will do a great deal toward influencing the greater use of gas in the home. For these reasons we think that the Blue Star Home Plan is one of the effective methods of advertising. The plan must be introduced by the gas company with the full cooperation of architects, contractors and builders.

*A. E. Holloway, Supt. of Commercial Dept. San Diego Cons. Gas & Electric Co.*

This is too young a plan to state that it is the answer to the gas man's prayer. We have gone through the struggle to put over a Blue Star home in San Francisco and we found it not a path of roses to get all the interests concerned to work for an all-gas home. This home will be opened in June and probably by this time next year we will be able to answer this question more intelligently.

*Ray Trowbridge, Industrial Gas Engr. Pacific Gas & Electric Co., San Francisco*

On the whole it is believed that the Blue Star plan marks a distinct advance in the commercial interests of the gas industry. The Blue Star plan will do more to permanently promote the sale and distribution of higher grade appliances than anything that has been done heretofore in the gas appliance field. It should rapidly discourage the sale of low grade, unapproved appliances and encourage dealers and distributors of gas equipment to handle only the best.

However, before the Blue Star plan can be actively promoted in any district, the dealer should be given an opportunity to get on the "band wagon" and follow the same plan as the local gas company without unnecessary embarrassment or loss of sales to the dealer. In other words, the dealer must supply himself with Blue Star appliances and be given an opportunity to dispose of his old stock. This can best be done by calling a meeting of all the dealers interested and acquainting them with the details of the Blue Star plan and invite their cooperation in putting the plan into effect. The dealer will then feel that he has had an active part in furthering the movement and will give it his whole hearted support, where otherwise he might be antagonistic toward it.

*J. Earl Jones, Assistant Sales Mgr. Portland Gas & Coke Company*

The Blue Star Home Plan is part of the answer to the gas man's prayer. The matter of making the plan effective is simply a matter of work and then more work. There is very little direction needed because the introduction of such innovations as Home Plan houses has been done in practically every other line and there will be no pioneering in it. It just needs a unity of effort and a vast amount of work.

*Lew Galbraith, Division Sales Mgr. Pacific Gas & Electric Co., Oakland*

### 7. Trade In Allowances?

*The necessity of making trade-in allowances on old stoves, when new gas ranges are sold, is a heavy burden on dealers and the merchandising departments of gas companies. How can it be controlled without sacrificing sales? Could the used automobile allowance plan be successfully adapted to gas ranges?*

**Answers**

In the City of San Jose the gas appliance dealers through their organization, the Gas Appliance Society, have to a large extent eliminated excessive trade-in allowances, thus abating the nuisance. The plan is as follows:

1. Dealer "A" has a prospect, Mrs. Smith. Mrs. Smith is in the market for a new gas range, but desires to trade in her old stove and invites Dealer "A" to make an appraisal on it. Dealer "A" calls up the San Jose Merchants Association and asks if any gas appliance dealer has appraised Mrs. Smith's stove.

*Case 1.*

The stove has already been appraised by Dealer "B," say for $15.00. Dealer "A" advises Mrs. Smith that he can allow her $15.00 for her old stove.

*Case 2.*

No previous appraisal. Dealer "A" calls at Mrs. Smith's house. After inspecting the old stove, he decides that when this stove has been re-conditioned he can sell it for $20.00, and the cost of re-conditioning is $2.00. He then makes the following calculation: $20.00 divided by two minus $2.00 =$8.00.

He then advises Mrs. Smith that he will allaw $8.00 for her old stove. Mrs. Smith says that she will think it over. Dealer "A" returns to his store and immediately calls up the Merchants Association informing them that he has appraised Mrs. Smith's stove for the sum of $8.00.

Later Mrs. Smith calls on Dealer "B" and asks Dealer "B" what he will allow her for her old stove on the purchase of a new gas range. Dealer "B" gets Dealer "A's" $8.00 figure and quotes it to Mrs Smith.

Although there have, of course been some cases where the rules have not been strictly followed, nevertheless in general this plan has been very successful and has saved the gas appliance dealers thousands of dollars in excessive trade-in allowances in the city of San Jose.

*J. S. C. Ross, Division Sales Mgr. Pacific Gas & Elect. Co., San Jose*

In the same sense that used automobiles have become an important factor in the merchandising of new automobiles, in like manner used range trade-ins deserve the very careful consideration of gas appliance distributors today as they affect the sale of new gas appliances.

Almost every home has some kind of a cooking appliance that is at least usable up to the time of purchasing new equipment. In however poor condition it may be, the owner expects some allowance, and usually far more than its actual worth, for the old range when a new one is purchased. There fore every dealer in gas ranges must be prepared to meet the situation. The question is, how to meet it with the minimum loss?

There are really three plans for taking in old ranges, namely: (1) To make an arbitrary allowance for the old range regardless of its value in order to promote the sale and distribution of better gas appliances, cut down service expense on old and obsolete pattern ranges and build customer satisfaction through the use of better equipment. (2) To take in the old range on an appraised value based upon its actual stock worth, making allowance for cost of reconditioning and other overhead expense. (3) To add sufficient net profit to the selling price of the new range to allow for the trade-in without taking a loss on the appliance sale regardless of the value of the old range.

PLAN NO. 1

The use of plan No. 1 is necessarily confined to gas companies only who may be willing to appropriate a sum for old appliance trade-ins as a means of stimulating the distribution and use of better ranges. Obviously a dealer merchant would be unable to follow this plan as he would soon become bankrupt on account of the heavy losses involved. It is even considered questionable practice for a gas company as it involves heavy losses and antagonizes appliance dealers who are unable to meet such competition. It is even doubtful if the gas company accomplishes anything worthwhile in the long run in following a selling plan not consistant with good merchandising. It is suggested that the money spent on trade-in losses might better be spent for advertising or other promotion work.

PLAN NO. 2

Plan No. 2 may be considered sound merchandising but it falls far short of encouraging the sale of new ranges. Very few old gas ranges that have been in use five years or more represent any stock value whatsoever after proper charges are made for reconditioning. The stock value of a reconditioned range and its resale price installed after reconditioning are widely different. For example, a used range that has an estimated resale value of $37.50 would only represent a net stock credit of $2.50 in a large range of the three oven type, and about $7.50 stock credit if it is a medium sized range with double oven, and about $11.25 stock credit if a small range with single oven. As a rule smaller used ranges are more easily sold than the larger obsolete types. The above example is based upon a reasonable mark up including installation cost, overhead expense and profit.

It is readily seen that the average used range taken in trade represents very little, if any, stock value after it has been thoroughly repaired. It is even then questionable practice to spend money on the old stove and resell it to a customer who may be unhappy with the purchase, in which case the appliance will have proved a detriment to the gas utility selling it.

From the customer's standpoint an appraisal on a used range based upon its net stock value, under Plan No. 2 would be very unsatisfactory as the allowance would be so small it would discourage the customer in buying a new range. Therefore some additional allowances beyond net stock value must be made if the customer is to be encouraged in turning in the old appliance as part payment on the new.

PLAN NO. 3

Plan No. 3 anticipates the new sale involving a trade-in and carries a sufficient profit in the mark-up to allow a reasonable amount for the old stove. Ordinary practice proves that a customer may be more willing to pay $10.00 more for a new range and receive $10.00 allowance for her old stove than to pay $10.00 less for the new appliance and receive nothing on the trade-in. It is god psychology in selling to satisfy the normal customer's demand for some allowance on the old merchandise traded in. Of course the customer knows the old range has little or no value but still feels that she is getting a good bargain if a liberal allowance is made for it.

The writer does not suggest that an excessive profit be added to the new range selling price in order to take care of the old range trade-in as this would discourage buying entirely. Nor should excessive allowances be made in any event on the old range as this, too, arouses the suspicion of the customer in believing that she is paying, in the long run, an excessive amount for her new appliance.

On the theory that trade-ins should be largely confined to old obsolete pattern ranges which give poor service and not to new appliances which a customer wants to dispose of because of a whim or change of sentiment in taste, it is believed that there should be very few exceptions to making allowances over $10.00 and in no case more than $15.00 or $20.00 for the best type of old range turned in.

Perhaps a combination of plan No. 2 and No. 3 offers the best solution for used range trade-in allowances. A margin of net profit on the new range sale, plus the actual net stock value on the old range to be taken in, should provide a sufficient amount to take care of the maximum reasonable requirements of any customer. This combination plan will encourage the customer to buy better appliances and will enable the gas company or dealer to take in the old equipment without any merchandise losses.

*J. Earl Jones, Asst. Sales Mgr.*
*Portland Gas & Coke Company*

We believe that trade-in allowance is absolutely necessary in order that we may remove from our lines obsolete and inefficient operating appliances. In our particular territory, we have a very hard water, ranging in degree of hardness from 28 to 40. In many instances, certain types of water heaters will completely clog within a period of three months and when this happens, immediately the consumer suffers with the shortage of hot water and increased gas bill and the utility loses revenue. Nine times out of ten, the water will be heated on a stove in a pan and the water heater will be abandoned. Therefore, we believe that we must first find the best water heater that will meet the requirements and we must see that this water heater is placed in the homes; and, in order to have a larger inducement to get this into the home where this condition exists, we must be able to give them a substantial allowance for their old appliance.

We have experienced a similar condition in gas ranges, referring to the oven which is rusted and in a dilapidated condition due to the fact that inferior gas appliances were originally purchased. With the oven not giving satisfaction, the housewife did not make use of it, and with these experiences we believe that if the gas utility still expects to maintain a satisfactory domestic load, it is absolutely necessary that a liberal allowance be made for the old appliance and that continuous effort must be made to replace obsolete equipment, and that a tie-in should be made, where possible, with a local merchant encouraging him to sell better gas appliances, using as your argument for trade-in allowances, the obsolete appliances that are removed and the effect that it has on our business. In most cases we have been able to convince the merchant of our reason for the trade-in allowance and have in no way jeopardized his appliance business, for the reason that most of his appliance business is new appliances in new houses.

We do not believe that the automobile allowance plan could be successfully adopted to gas appliances, for the reason that an appliance that is replaced in 99 per cent of the cases is classified as "junk" and it would not be advisable to reclaim and replace this equipment on our lines.

*J. C. Gilbert, Dist. Supt.*
*Southern Counties Gas Co.*
*Santa Monica, California*

The trade-in allowance problem has been solved by our company in the following manner:

1. By obtaining exclusive sales rights on certain gas ranges and water heaters.

2. By setting the sales price sufficiently high to allow 10 per cent (based on the resale value of the new appliance) for trade-in allowance. Our salesmen stand one half of the trade-in allowance.

3. By either selling trade-in appliances for junk or, if the appliances are serviceable, by reselling to the public; in no case do we put such trade-in appliances into stock.

*A. F. Morairty, Asst. Gen'l. Mgr.*
*Central Ariz. Lt. & Pr. Co., Phoenix*

**8. Rate Structures?**

*Are existing gas rates based upon present business conditions? If the commercial executive were free to set his own prices as is the sales executive of a manufacturing concern, what would he do and how would he go about it?*

**Answers**

We think that rate structures should be based upon the joint judgment of the rate expert and the executive in charge of sales rather than upon the judgment of either of these parties alone.

*A. G. A. Commercial Section*

Existing gas rates are not based upon present business conditions. We lack a scientific rate similar to the one used by the electric companies; if we had such a rate we believe it would increase our business enormously. Particularly is this true where there are a number of gas appliances in the home and the proper rate structure combined with the group selling of these appliances would do a great deal toward building up our present gas load.

*Ray Trowbridge, Industrial Gas Engr.*
*Pacific Gas & Electric Co.*

In my opinion gas rates for the present should be made in the same manner that merchandise selling costs are made; that is, cost of manufacture, competition, supply and demand. This could be very effectively worked with a two or three part rate, either

a maximum demand or a consumer charge per month with a low commodity rate.

*J. C. Gilbert, Dist. Supt.*
*Southern Counties Gas Co.*
*Santa Monica, California*

Rate structure is something that would be very difficult to discuss in a questionnaire. It doesn't seem advisable from present viewpoint for the commercial executives to set their own prices upon gas. As a matter of fact, there is the greatest inclination apparent on the part of the rate making groups of the different utilities to cooperate with the commercial and sales sections. It would seem, from the observations we have made upon the subject, that the rate departments are seeking the views of the sales executives and members of sales organizations from the standpoint of developing an "inducement rate."

*Lew Galbraith, Division Sales Mgr.*
*Pacific Gas & Electric Co., Oakland*

**9. Compressed Gas?**

*Can compressed gases such as Rock Gas or Pyrofax be used by gas companies to hold territory for gas which is not yet on the company's mains?*

**Answers**

We do not believe that compressed gas can be used successfully to hold territory for any great length of time due to the fact that it is necessarily more expensive than other types of fuel. If the gas company desires to hold the territory badly enough to lose some money on it, then this method would probably be satisfactory.

*A. E. Holloway, Supt. of Commercial Dept.*
*San Diego Cons. Gas & Electric Co.*

We believe that compressed gases such as Rock Gas or Pyrofax could readily be used to hold territory for gas which is not yet on the company's mains. We have had a number of inquiries every month for further information regarding compressed gas and a number of installations have been made in this territory off of the present gas company mains.

*Ray Trowbridge, Industrial Gas Engr.*
*Pacific Gas & Electric Co.*

Compressed gas, such as Rock Gas and Pyrofax, can be successfully used to hold territories for gas companies, but not unless the compressed gas equipment is controlled by the gas utility, that is, on a rental basis to avoid the heavy expenditures of equipment and first costs. At the present time, this is not being done and consequently territory is not being held that rightfully belongs to gas utilities.

*J. C. Gilbert, Dist. Supt.*
*Southern Counties Gas Co.*
*Santa Monica, California*

Speaking for our own company, the commercial executive as well as the other officials of the company would like to see a much lower rate, but our costs are such that we can not make a rate decrease and still make our proper returns.

*A. F. Marairty, Asst. Gen'l. Mgr.*
*Central Ariz. Lt. & Pr. Co., Phoenix*

# PUBLIC RELATIONS

**1. High Bill Complaints?**

*What is the best way to handle high bill complaints? What proportion of complaints can really be satisfied by the method you recommend?*

**Answers:**

The manner in which a high bill complaint is disposed of depends a great deal upon the clerk receiving it. The consumer in making a complaint usually presents his bill in substantiation of his statements. The bill in all cases should be scrutinized carefully, because in numerous instances, careful scrutiny reveals errors that can be corrected in the office without the necessity of sending out an inspector to check the installation, which involves the expenditure of considerable time and money. However, in a great many cases the "elbow touch" is highly desirable. The assurance some consumers derive from our inspector checking up on the meters, as well as the household appliances, tends to eliminate future complaints and often results in lasting confidence and satisfaction.

Encouraging the consumer to read his own meter is an important aid in eliminating the element of mystery that is often associated with gas and electric bills, and it helps the consumer to understand the method by which his bills are computed. Meter reading cards, explaining the reading of a meter, are supplied the public by the company.

When the consumer complains that both his gas and electric bills are too high, or that either the gas or electric bill is too high, and the increase over the previous month's consumption is not disproportionate, the complaint is entered on a form for this purpose and forwarded to the billing department where the billing record for one year of the account in question is filled in on the reverse side and returned to the investigation department. The order is then checked to see if the meter reading on the ledger agrees with the meter reader's book. After this has been done the order is given to an inspector who checks the meter to see that it has been read correctly, and also to detect any possible leakage. He also goes over the house appliances to see that they are operating satisfactorily.

Where it is found after questioning the consumer that the bill he complains of, (either gas or electric, but not both) is approximately two or more times the amount of the previous bills, a rereading order is made out and sent to the head meter reader for execution, the customer being informed of the result by mail. The result of the rereading will prove whether the original bill as rendered is correct or incorrect. In the latter case, the completed reread slip is forwarded to the billing department to have a corrected bill made out and sent to the customer.

The meter is tested when the consumer requests a test or the clerk receiving the complaint thinks that a test will convince the consumer as to the accuracy of his bills. The consumer is advised by letter as to the result of the test. In a great many cases we set a check meter in line with the house meter, thus getting a graphic chart. This seems to be the most satisfactory way to prove that the meter in question is correct or incorrect.

Regarding the proportion of high bill complaints settled satisfactory to customer and company, I should say 95 per cent.

*A. E. Holloway, Supt. Commercial Dept.*
*San Diego Cons. Gas & Electric Co.*

High bill complaints viewed from a public relations standpoint should not be differentiated from complaints arising from other causes. They merely represent a dissatisfied consumer attitude and should, as in the case of all other complaints, be handled in such a way as will promptly and effectually remove this dissatisfaction—not however, without due consideration to imposition on the serving company.

The first and most important thing to do is to listen, and listen sympathetically, to the consumer's story. Do not by action or word imply resentment of or impatience with the complainant. To him the complaint is real —treat it as such.

Procure all information possible as to appliances installed and their normal usage. If the high bill has occurred during a period of abnormal low temperature, produce your weather temperature charts and explain the effect of this condition on gas consumption. If no unusual conditions are apparent, proceed with routine methods such as check reading, inspection of appliances, and meter testing. Should the high bill complaint result from an under read meter in previous billing, careful explanation of methods of computation will generally satisfy the consumer that he has not been penalized by the error. Do not forget, however, that the error, if one is made, is the company's and not the consumer's, and if the latter is unable to understand or unwilling to accept the explanation made, the company should take a generous attitude in such adjustment as may be reasonably necessary to satisfy the complainant.

When after careful investigation, it develops that no error in readings, computation, or accuracy of metering equipment has occurred and there are no attendant extenuating circumstances in the case, then the company representative should courteously but firmly insist on settlement in accordance with the facts obtained. In case of a reasonable doubt resolve that doubt in favor of the consumer, remembering that an error by the company may and usually does constitute a reasonable doubt. In the absence of any reasonable doubt arbitrary adjustments are not warranted and, if made, are discriminatory and therefore unfair alike to the company and to its other consumers who are not similarly favored.

In my opinion no definite routine procedure can be successfully followed in the handling of any complaints, including those arising from high bills; they vary as to the individualities of the consumers making them.

If the method as above outlined is adhered to, the proportion of complaints satisfactorily disposed of will depend to a very large degree upon the experience, judgment, tact, and general overall behavior of the personnel of the adjusting department. If this personnel is as it should be, substantially complete consumer satisfaction will result.

*D. C. Ray, Mgr. Bureau of Public Relations*
*Pacific Gas & Electric Company*

The system used by the Portland Gas & Coke Company for handling high bill complaints is unusually complete and effective. The office department has prepared a loose leaf manual on high bill complaints which states in its foreword that the proper treatment is 10 per cent mechanical and 90 per cent psychological. The book thoroughly covers the treatment of complainants, the causes of high bills, and gives a great deal of information about meters, rates and appliance inspections. It also gives cost of competitive fuels, capacities of appliances for sale in Portland, data on flow and usage of hot water, and tables of typical installations with their average gas consumption and bills.

The total number of high bill complaints received during 1927 was 15,098, of which 2.7 per cent came in by mail, 14.5 per cent by telephone, and 83 per cent by office calls. Of this total 84 per cent were satisfied at the office. Field inspection was ordered for the remaining 16 per cent, or 2,438, and only 336 meters were specially tested, this being 14.5 per cent of the field inspections and 2.2 per cent of the total number of complaints. Tables 1 and 2 give detail of actual high bill operations for February, 1928.

No high bills are discussed at the counter. Small partitioned-off offices are used for this purpose and tables are provided in event all these offices are occupied. Every reasonable effort is made to handle complaints in a thorough and courteous manner.

*W. H. Barton, Office Manager*
*Portland Gas & Coke Company*

TABLE 1. COMPLAINTS RECEIVED BY HIGH BILL CLERKS FEBRUARY, 1928

| *Complaints* | *Letters* | *Phone* | *Calls* | *Total* | *Average Calls per Day* |
|---|---|---|---|---|---|
| High Bills | 50 | 408 | 852 | 1510 | 59.545 |
| Miscellaneous | 36 | 119 | 153 | 308 | 14.0 |
| Total | 86 | 527 | 1005 | 1618 | 73.545 |

*Disposition of High Bill Complaints*

| | |
|---|---|
| Calls on previous high bills | 41 |
| Removed for special test | 2 |
| Corrected bills account overread | 67 |
| Other corrected bills | 108 |
| Inspection ordered | 293 |
| Satisfied | 601 |
| Service calls written | 18 |
| Dial cards | 180 |
| Total | 1310 |

*Nature of Miscellaneous Complaints*

| | |
|---|---|
| Addressograph changes | 6 |
| Appliances installed unsatisfactorily | 3 |
| Appliances operate unsatisfactorily | 3 |
| Delivery of bills—duplicate issued | 54 |
| Discount allowance | 61 |
| Gas billing incorrect | 18 |
| Explained bill calculation | 2 |
| Leak at meter credit | 18 |
| Merchandise billing incorrect | 3 |
| Meter charged to wrong party | 26 |
| Meter location complained of | 2 |
| Meter shut off by mistake | 2 |
| Minimum charge disputed—claims vacating notice given | 44 |
| Overpaid credit explained | 2 |
| Piping or repair charge claimed excessive | 11 |
| Piping or repair charge incorrectly figured | 1 |
| Prepay billing incorrect | 31 |
| Prepay instructions given | 16 |
| Tariff explained | 1 |
| Briquet calls | 4 |
| Total | 308 |

20 service calls written in addition.

TABLE 2. INSPECTOR'S REPORT—FEBRUARY

| *Date* | *B.B. Rec.* | *B.B. Insp.* | *Misc.* | *Total Seen* | *Total Calls* | *Hours* |
|---|---|---|---|---|---|---|
| 1 | 14 | 13 | 3 | 16 | 19 | 16 |
| 2 | 7 | 14 | 6 | 20 | 26 | 16 |
| 3 | 15 | 10 | 7 | 17 | 22 | 16 |
| 4 | 17 | 4 | 1 | 5 | 7 | 8 |
| 6 | 14 | 7 | 9 | 16 | 27 | 16 |
| 7 | 16 | 17 | 2 | 19 | 29 | 16 |
| 8 | 17 | 17 | 1 | 18 | 24 | 19½ |
| 9 | 21 | 16 | 8 | 24 | 29 | 16 |
| 10 | 6 | 16 | 2 | 18 | 29 | 17½ |
| 11 | 4 | 3 | 0 | 3 | 4 | 8 |
| 13 | 6 | 15 | 3 | 18 | 23 | 20 |
| 14 | 10 | 9 | 4 | 13 | 17 | 10½ |
| 15 | 6 | 14 | 4 | 18 | 20 | 16 |
| 16 | 5 | 10 | 4 | 14 | 17 | 16 |
| 17 | 8 | 8 | 5 | 13 | 18 | 14 |
| 18 | 6 | 4 | 1 | 5 | 8 | 8 |
| 20 | 22 | 12 | 5 | 17 | 24 | 16 |
| 21 | 16 | 5 | 5 | 10 | 17 | 16 |
| 23 | 9 | 13 | 3 | 16 | 20 | 16 |
| 24 | 14 | 11 | 4 | 15 | 23 | 16 |
| 25 | 5 | 4 | 2 | 6 | 9 | 8 |
| 27 | 13 | 12 | 2 | 14 | 24 | 16 |
| 28 | 18 | 18 | 0 | 18 | 25 | 16 |
| 29 | 15 | 10 | 6 | 16 | 20 | 16 |
| Total | 284 | 262 | 87 | 349 | 481 | 352 |

| | |
|---|---|
| No. days worked | 44 |
| Aver. B.B. Inspec. per day | 5.955 |
| Aver. Misc. Inspec. per day | 1.977 |
| Aver. Total Inspec. per day | 7.932 |
| Aver. Total Calls per day | 10.932 |
| Payroll | 324.58 |
| Transportation | 45.92 |
| Total Expense | 370.50 |
| Cost per Inspection | 1.06 |
| Cost per Call | .77 |

The experience of the Southern California Gas Company has been that it is best to handle a high bill complaint before it exists, by careful meter reading, prompt checking of bills for errors, and by employing expert bookkeepers who are alert for mistakes.

As a satisfied customer is a company's best asset we should give prompt attention to a high bill complaint whenever an error does slip through. This should be done whether the complaint is reported to the meter reader, to the collector, is given at the counter, or information is sent by mail.

Some customers show enough interest in the service we render them to come to the office in person to make a high bill complaint. These should be handled in an adjuster's office where the customer can tell his or her story in full, without interruption, privately. Even a few flowers aid greatly in placing the customer at his ease. And the adjuster who interviews the customer should be chosen with special attention to his tact, courtesy and knowledge of the service we render.

All the information received from the customer should be checked carefully and in detail in regard to billing dates, weather conditions, and other matters bearing on the service rendered. The records should be produced and gone over with the customer, nothing being kept from him, thereby creating the feeling in his mind that there is nothing being hidden or withheld.

During 1927 the experience in the Los Angeles City District of the Southern California Gas Company shows the following:

| | % |
|---|---|
| Customers satisfied on the first call without further investigation | 88 |
| Customers who needed to have their appliances adjusted | 5 |
| No defects—economical condition | 3½ |
| Leaks | 2 |
| Misread meters | 1 |
| Fast meters | ½ |

*F. C. Ingraham, Mgr. Customers Dept.*
*Southern California Gas Company*

# TECHNICAL

## 1. Coal Gas Plant Operation?

*In a small coal gas plant with only one holder, there is difficulty in maintaining a sufficiently uniform heating value. The plant is not large enough to warrant the employment of a head gas maker, and the stokers are often too busy to watch the operation closely. Occasionally, therefore, the seal will be lost, the vacuum will become too high or the heats will be affected. Also, during peak hours, the gas appears to go right through the holder without mixing and this tends to aggravate the situation. Is there a practical and inexpensive solution for this condition?*

### Answers

Our actual experience with small coal plants is somewhat limited but it would seem that a recording calorimeter such as the Thomas would be of great help to the stokers in giving the continuous heat value readings. Such calorimeters can be provided with indicating lights to show high, medium and low readings.

*E. L. Hall, General Supt.*
*Portland Gas & Coke Company*

The fact that there is only one holder should not, in itself, make any difference as many coal gas plants, large and small, have only one holder. Equipment cannot eliminate the personal equation entirely, but comparatively inexpensive equipment can be obtained for maintaining the seals and controling the vacuum on the ovens or retorts.

A Connelly retort house governor and a circulating pump system with a reserve gravity feed liquor tank would assist in maintaining the seals. Someone must be responsible for the heats and watch them closely. A Brady B.t.u. Indicator would assist in B.t.u. control.

*J. T. Sullivan, Supt. Gas & Water Dept.*
*Truckee River Power Company*

Check over things affecting heating value, assuming of course that heats must be kept uniform.

Charges on retort should be so scheduled that only one or two are pulled at one time; if two, these should not be adjacent retorts.

It may be that dip pipes from various retorts are not exactly level so that it is not possible to maintain a uniform seal on all the retorts. Be sure the hydraulic main is level.

If these points can be corrected, the next possibility is uniform suction secured from the exhauster. This can be regulater by the usual exhauster governor provided the variation in steam pressure is not excessive. In this latter case, use a reducing valve on the steam line to the exhauster.

Excessive variations in heating value may be due to a great variety of operating conditions of which the above are only the most obvious. A great deal depends on the personal interest of the stoker.

*Frank Wills, Engineer of Production*
*J. E. Kelley, Asst. Gas Engineer*
*Pacific Gas and Electric Co.,*
*San Francisco.*

## 2. Electric Precipitators for Tar?

*How successful is the electric precipitator in the de-tarring of gas? Please furnish operating data and details.*

### Answers

The Cottrell Process of Electrical Precipitation as used in Denver, Colorado, has been described before this Association (Vol 16, P. 400). It is used on one water gas generator in conjunction with a liquid purification plant and has a capacity of 500,000 cubic feet per hour and attains 95 per cent removal of suspended matter. Its cost was $11,000. Operating costs were low and in general the apparatus gave great satisfaction.

In the discussion Mr. F. W. Steere said there is danger from explosion due to static electricity, and Mr. E. L. Hall said the precipitator did not work well when used on a mixture of tar and dust in the Portland briquet plant.

This process is also discussed by Mr. S. C. Schwarz (Vol. 18, P. 272). He quotes Mr. H. M. Pier as saying that the explosion risk is negligible, as in over 20 installations operating for from two to three years and treating in excess of 300 million cubic feet

per day, there have been no explosions. Absorber coils have been developed to do away with a tendency to interfere with radio.

*The Secretary*

We do not as yet have any actual experience with tar removal by means of electrical precipitation. We are considering the installation this year of a unit large enough to handle the gas from one generator and plan to first undertake test on the removal of tar-free lampblack and subsequently the removal of tar from the gas. We are now installing a large unit for the removal of tar from smoke containing approximately 1/3 grains per cubic foot. This unit will go into operation in July. Since the temperature of the smoke is 200°F. or less, and it is saturated with water vapor, the experience will not be of much value in determining the probable success of the process on tar from hot gas. We understand that the Western Precipitation Company has some successful installations in the East and by writing the gas companies some data can no doubt be obtained.

*E. L. Hall, General Supt.*
*Portland Gas & Coke Company*

In the Gas Age-Record for April 14th, 1928, there appears an article on "The Cottrell Electrical Precipitation Processes" and it is noted therein that there are 23 installations for detarring water gas, two for detarring low temperature carbonizing unit gas, one for detarring coke oven or coal gas, and four for detarring gas from asphalt stills, all of which are operating successfully.

*J. T. Sullivan, Supt. Gas & Water Depts.*
*Truckee River Power Co.*

The U. G. I. Company has two installations, each of 30,000 M. cu. ft. capacity at their two stations in Philadelphia. The earlier of these installations was one of the first installed in this country and has been in operation for nearly four years. The most striking point in this installation is the nature of the drips from the bottom of the purifier boxes. Where formerly when using tar extractors, this drip was of a heavy tarry nature, it now runs practically clear and water white. The purifiers were changed on account of back pressure due to tar for 85 per cent of the changes, when using the tar extractors. After using the Cottrell, practically no changes were required on account of tar, with a resultant increase in purification efficiency and cost.

The precipitator unit removes the water and tar from the gas, which is in the form of a mist; the resultant mixture, after leaving the precipitator shell, is led to regular tar separators where the tar readily separates out from the water.

In general, I would say that the users of the electric precipitation system for tar removal find it far superior to the P. & A. Tar Extractors and shaving scrubber.

*C. A. Schlegel,*
*U. G. I. Contracting Co.,*
*Philadelphia.*

An installation has been in operation for some years on cold producer gas made in Morgan producers and passed through primary scrubbers, Ernst washer and a baffle dryer. At the outlet of these cleaning devices the gas contains 2 to 3 grains of tar per cubic foot. The electrical precipitator reduces this to an average of .005 grains, permitting it to be used in gas engines. The operating cost is approximately $1.45 per million cubic feet.

*From article by Ray V. Wood in*
*The Glass Industry, June 1923.*

**3. Water Gas Tar?**

*What can be said about the de-emulsifying of water gas tar?*
*What is the most successful apparatus? Give details.*

**Answers**

Our water gas tar is an emulsion after it comes from the extractor, condensers and scrubbers. This emulsion is pumped to the relief holder where it gradually breaks up into tar and water. Our tar is sold in tank car shipments and the water content has not been over two per cent. The cone shaped bottom of the relief holder with the tar outlet at the apex helps to cause a practically complete separation. Seattle is having excellent results with Sharples centrifugal machines.

*J. J. Ferrari, Supt. Gas Dept.*
*Puget Sound Power & Light Co.,*
*Bellingham*

We can thoroughly recommend the R-S de-emulsifier which has been in successful operation at our plant on oil gas tar containing approximately 60 per cent water. The Semet Solvey Engineering Corporation are manufacturers of this device. Its operation is very simple, consisting of heating the tar emulsion with steam coils in a closed tank until a pressure of approximately 30 lbs. per square inch is built up. The addition of a small amount of caustic soda solution is necessary with some tars. The labor is small as it can be performed by a man in conjunction with other duties such as pumping drips or attending purifiers. The Portland Gas & Coke Company finds the cost to average approximately ½c per gallon of dry tar.

*E. L. Hall, General Supt.*
*Portland Gas & Coke Company*

The Sharples Super-centrifuge is very satisfactory for the dehydration of tar emulsions in the small plant where the operation is likely to be intermittent.

The total cost of dehydrating will be approximately $1.25 per gallon of dry tar. Where large volumes are to be handled, and the process is a continuous one, the Semet-Solvay Engineering type of dehydrator is very successful.

The Sharples Centrifuge travels at a high rate of speed—15,000 to 17,000 R.P.M. with dry tar being removed from the outer edge of the cylinder and water from the center.

In the Semet-Solvay dehydrator a batch of emulsion is brought to a relatively high temperature by steam heating and the water allowed to blow off in the form of steam by gradually reducing the pressure on the tank.

*J. T. Sullivan, Supt. Gas & Water Dept.*
*Truckee River Power Company*

Here at Marysville we use the R. S. de-emulsifying equipment manufactured by the Steere Engineering Company. In order to prepare a batch of tar emulsion, the emulsion is run into a tank of about 600 gallons capacity. The tank is not quite filled, allowing about 15 per cent for expansion. A solution of soda ash is introduced and steam heat applied to the extent of about 60 pounds pressure through coils on the interior of the tank. This is allowed to stand for a short while and the steam is then shut off. The emulsion is then allowed to cool, say over night, or until it drops back to atmospheric temperature. The prepared tar is drawn off the bottom and the moisture is then drained from the tank and a new batch started. We have been using this system for the last year and a half and have been able to reduce our emulsions to 2 per cent moisture, and make a very good marketable tar.

*J. F. Sauer, Div. Gas Supt.*
*Pacific Gas & Electric Co., Marysville*

**4. Dust in Mains and Services?**

*What practical solution is there for the prevention and removal of dust from mains and services?*

**Answers**

The most practical solution is partial dehydration. While it has not been definitely established that moisture is the principal cause of corrosion in mains and services resulting in dust accumulation, it most certainly has been established that in plants where partial dehydration is accomplished, through compression or otherwise, troubles of this kind are minimized or eliminated, together with a decided improvement in meters, regulators, and general service conditions.

*J. T. Sullivan, Supt. Gas & Water Depts.*
*Truckee River Power Company*

Prevention is the best solution in this case. I believe a large percentage of the dust in mains and services is put in with the pipe when installed. A thorough cleaning of all pipe before it is laid in the ground and connected, should reduce the dust accumulations. We clean out the large lumps of dirt and pieces of scale, of course, but we do not shake out the fine impalpable dust which covers the inside surface of all pipe as it is received from the factory. I should like to see every piece of pipe up-ended and pounded to shake loose all loose material, however fine, and then give it a thorough blowing with high pressure air just before it is laid in place in the ditch and connected up.

Of course, the gas should be cleaned at the plant from sulphur compound which tends to corrode the walls of the pipe. This is a purifying problem, exclusively.

When a system is thoroughly saturated with deposit there is no cure. It is then only possible to attempt to remove the deposit ahead of the district regulator pits by means of using one of several types of separators. These separators are usually in the form of a drip pot or pocket in which there is a baffle to abruptly change the flow of the gas and fine screens and hair filters through which the gas must pass. These devices are very effective as long as they are clean. It is sometimes recommended that the device be saturated with waste automobile oil to increase the adherence of the deposit in its passage. When the filtering device has become saturated with deposit, it must of course be cleaned, and the period of cleaning depends entirely upon the amount of deposit which has accumulated. I believe here that prevention is worth while. Clean the filters before they are saturated and save the seats on the regulators and reduce the accumulations of deposit on the low pressure side. This is easier said than done, but a systematic method of cleaning should be planned, with an increasing frequency of cleaning periods during the winter months.

We have found it well worth while to blow our high pressure mains into a tank whenever we have occasion to disconnect the filters for cleaning purposes. By continuously blowing for a period of 20 to 30 minutes at a time and as often as four times a month, we have succeeded in removing the deposit in the immediate vicinity of all our filters. This relieves the situation for a period and permits the filters to operate for a longer period before cleaning

is again necessary. We have a very satisfactory tank into which the high pressure gas can be discharged, if in the closely settled city districts. The gas of course escapes into the atmosphere, but the dust is all shaken into and held in the tank.

*O. L. Dickinson, Division Supt. Pacific Gas & Electric Co., Fresno*

Dust in gas mains and services is the result of deterioration of the interior walls of the pipelines. Deterioration occurs in the presence of condensed moisture which serves as a vehicle for oxygen, sulphur dioxide, carbon dioxide, and other corrosive elements in the gas.

Authorities now generally agree that in a dehydrated (dry) gas these elements are inactive and do not cause any corrosion of the pipe lines. Dust and scale with their serious consequences are not produced and the life of pipe lines is increased.

There are several methods of dehydration but the one practiced in San Diego is by compression. Due to the seasonal loads the total capacity of our compressor and after-cooler station is utilized in pumping to the high pressure system for only about two months of the year. During the remaining 10 months of the year gas is compressed and delivered through regulators at the works into the low pressure distribution system without any large expenditures for additional equipment over that required to handle winter loads.

The control of dust in our mains and services has been quite a serious problem, especially with reference to the reduced carrying capacity of pipe lines, the failure of proper pressure control by district and housetype regulators, and the clogging of pilot lights on our customers' appliances. In several instances we have found the capacity of high pressure transmission lines reduced to such an extent that 40 or 50 pounds pressure would prevail on the upstream side of the stoppage and only five or 10 pounds on the down-stream side. These stoppages were located by setting pressure gauges along the line. In one case the stoppage occupied only 25 feet of pipe, and in another case it extended at intervals through 1500 feet of line. These stoppages were solid masses of dust which had been alternately wet and dry. They were cleared by taking the lines out of service and scraping short sections with flat blades welded to a heavy bar. This bar was pulled back and forth through the pipe with a steel wire.

We were unable to blow out these packed stoppages with compressed air or wash them out with water from a high pressure fire hydrant. One section of choked main was filled with gasoline and allowed to soak for several weeks. This aided in clearing the stoppage, but it was still necessary to do some scraping. After the scraping process the lines were washed out with fire hydrant water pressure and then blown clean with compressed air. The cost of clearing stoppages of this nature in four-inch pipe was 44 cents per foot of main.

Dry dust can be blown from mains with compressed air at a very reasonable cost as follows:

| | |
|---|---|
| 1-inch | $ .012 per foot |
| 2-inch | .028 per foot |
| 4-inch | .044 per foot |

During the year 1927 we cleared dry dust and packed stoppages from 12.5 miles of 1 inch, 1½ inch, 2 inch, and 4 inch lines at an average cost of $.047 per foot. The above figures include labor, material and the regular hourly charges for trucks and compressors; also the cost of a recording gauge leakage test after clearing.

Service pipes were cleared in the same manner as the mains but no record was kept of the cost. Little difficulty was experienced in clearing the services after the mains were cleared.

We have not been able to secure a solvent for packed stoppages which will not be injurious to the metal in the pipe.

For the control of dust at district regulator stations we have installed filters designed by our assistant distribution superintendent, Mr. Wolfe Volk. These filters consist of a cartridge of wire mesh and muslin six inches in diameter and five feet in length, installed in the center of a 20-inch pipe. The gas enters the compartment between the cartridge and the large pipe and filters through the muslin before entering the regulator. They are so installed that a flange can be removed from one end and the cartridge withdrawn into the regulator pit for inspection and cleaning. These filters have aided materially in protecting the regulator valves and eliminating pilot light stoppages.

Prior to the adoption of this filter we used several filled with oil. The oil retained the dust as the gas bubbled through. These were not as satisfactory as our present type as some of the oil was carried over unless they were installed at a considerable distance ahead of the regulators. They were also difficult to clean unless installed above ground.

There are several materials on the market which are quite satisfactory for filters ahead of housetype regulators. Among these are oiled horsehair and Louisiana sea moss. We have used a number of each with good results. They have been installed at locations where we have had chronic cases of regulators failing on account of dust in the lines. We have not standardized on installing a filter at each housetype regulator installation. The use of oiled horsehair for this purpose is a patentend process. It seems to give somewhat better results than the sea moss.

The San Diego company was one of the first on the Pacific Coast to call attention to and tackle the problem of dust prevention and control, but other companies have recently taken up the battle and are now making progress. Those who have not yet considered it seriously are urged to do so if for no other reason than their own protection. At least each company should assure itself that it is not allowing a dust problem to develop in its distribution system when such a problem could be prevented by dehydration of its gas.

*D. H. Perkins, Supt. of Distribution San Diego Cons. Gas & Electric Co.*

During the past winter season, we have had an extreme amount of difficulty from fine dust (principally iron dust) in gas mains and services. This very fine material has plugged regulators and gas appliances, causing a great amount of annoyance. It is very difficult to completely eliminate the trouble, as moisture in the gas causes interior corrosion of the pipes, which is eroded or blown off with the gas when flowing at high velocities during periods of heavy load. Therefore, we have little trouble in the summer, and a great amount of annoyance in the fall or early winter when the gas velocities increase and stir up this dust.

With our change to natural gas service, our mains and entire system dried out, causing much of this rust to scale off and then be ground up due to its movement along the pipe. We are now introducing small amounts of light neutral oil into the mains by atomizing it with high pressure gas. Previously, we have atomized this oil with steam, but the steam of course adds to the moisture and continues the corrosion. We are unable at the present time to make any statement as to the effect of the introduction of the oil by our present method, as this has not yet been in effect for a sufficient length of time.

We have been most successful in the removal of dust by the installation of a special type of dust trap or filter, somewhat resembling that used by the San Diego company. This consists of a piece of 16-inch or 20-inch pipe placed in a horizontal location with the inlet pipe, admitting the gas along the side. One end of the large pipe is closed by a welded head, while the other end is closed by a removable flange. Within the large pipe is a framework covered with wire gauze, and over this gauze is placed one or two layers of muslin which act as a filter. The out-going gas is caused to pass through this filter and out through a separate line leading from the filter element. We have had a few cases where the filter element has collapsed due to plugging up of the filter cloth by the fine particles removed from the gas. However, this type of filter has, in general, been quite effective. I am now designing this filter so as to put it into a vertical position, which will make it more convenient and possibly permit blowing the dust out of it through a large hose attached to the bottom of the trap. These filters are, of course, placed in manholes or governor vaults ahead of a district regulator.

*H. L. Masser, Vice Pres. & Executive Engr. Los Angeles Gas & Electric Corporation.*

### 5. Gas Plant Smoke?

*What experience have members had in regard to complaint of smoke conditions at their plants? Is the use of cyclones or other such apparatus effective in removing cinders and solid matter from the stacks of oil and water gas generators? Supply data.*

**Answers**

Prevention is the best method. Do not let the generator accumulate carbon. There is a small amount of carbon necessary and desirable, and with a small amount of carbon in the generator there is not an excessive discharge from the stack. An ordinary steel stack with screen seems to check carbon discharge to a certain extent. If the gas plant is located in a closely settled district, there will of course be complaint from even a small amount of carbon discharged from the stock of the generator during the blowing and heating period. I have no suggestion to offer, but I believe a device could be designed that would eliminate all carbon discharge into the surrounding territory.

I think most of the trouble occurs from careless operation and a large accumulation of carbon in the generator. Then when this becomes heated and a blast starts to move it, it flies all over the country.

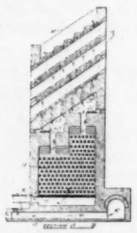
*O. L. Dickinson, Div. Supt. Pacific Gas & Electric Co., Fresno.*

Smoke can be prevented by a water cooled soot arrester in the form of a scrubber or spray chamber. These are efficient in the elimination of smoke, but the maintenance cost is very high due to corrosion of metal parts. Three or four months is the average life of such a device unless the metal is very heavy.

*J. E. Kelley, Asst. Gas Engineer, Pacific Gas & Electric Co., San Francisco.*

# THIS MONTH'S PATENTS PERTAINING TO THE INDUSTRY

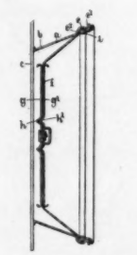
1,663,847. GAS RETORT. HEINRICH KOPPERS, Essen-Ruhr, Germany, assignor to The Koppers Development Corporation, Pittsburgh, Pa., a Corporation of Pennsylvania. Filed Aug. 31, 1921, Serial No. 497,362, and in Germany Mar. 6, 1918. 7 Claims. (Cl. 202—9.) (Granted under the provisions of the act of Mar. 3, 1921, 41 Stat. L., 1313.)



1. In a gas retort construction, in combination: a plurality of retort chambers assembled in a joint envelope; heating flues surrounding said retort chambers, said flues being operatively disposed into reversibly-operable inflow and outflow groups; reversibly-operable regenerators operatively disposed into inter-changeable outflow and inflow groups the reversal being laterally to said retort, the inflow-operating group embodying gas and air regenerators; a front and a back pair of distributing chambers communicably connected with said gas regenerator and each one of said pair with one of two series of inflow-operating flues; and a front and a back single distributing chamber interposed between the two aforesaid distributing chambers and communicably connected with both the air regenerator and with the two series of inflow-operating flues; substantially as specified.

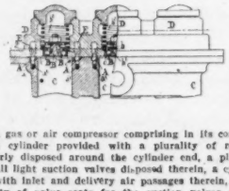
1,664,193. GAS METER. ALBERT GEORGE COOKE and BENJAMIN CHARLES PHILLIPS, Hove, England. Filed Mar. 25, 1925, Serial No. 18,259, and in Great Britain Aug. 14, 1924. 2 Claims. (Cl. 73—1.)

1. A measuring chamber for dry gas meter comprising a partition, a rim soldered thereto, an annular semi-ellipse shaped recess swaged at the outer edge of said rim, a removable diaphragm mounted on said rim, a



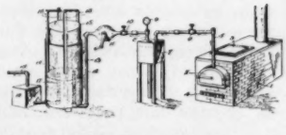
split spring ring inserted into said annular recess over said diaphragm, and said diaphragm being secured to said rim near the respective ends of said swage.

1,652,978. AIR OR GAS COMPRESSOR. ARTHUR GUY EXOCK, Hailsham, England, assignor to Burlectas Limited, London, England. Filed Feb. 9, 1926, Serial No. 86,323, and in Great Britain Apr. 14, 1925. 8 Claims. (Cl. 230—172.)



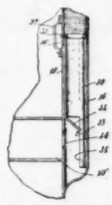
1. A gas or air compressor comprising in its construction a cylinder provided with a plurality of recesses annularly disposed around the cylinder end, a plurality of small light suction valves disposed therein, a cylinder head with inlet and delivery air passages therein, and a plurality of valve seats for the suction valves on the underside of cylinder head.

1,664,284. DOMESTIC GAS PLANT. AUGUSTUS L CLARK, Montpelier, Vt. Filed Nov. 9, 1926. Serial No. 147,354. 2 Claims. (Cl. 48—90.)



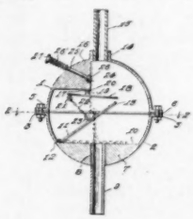
2. A domestic gas plant capable of manual operation having in combination, a domestic heating apparatus, means for feeding said heating apparatus from the top thereof, a retort mounted directly on and heated by said heating apparatus said retort having a door, a hydraulic tank, a valve-controlled pipe from the retort to the hydraulic tank and terminating at a point below the water level of said tank, a gas exhauster, a manually operated valve controlled conduit from the hydraulic tank to the gas exhauster, a telescopic gas holder having a telescoping section provided with guide arms of nearly equal length to the aforesaid telescoping section, a conduit from the gas exhauster to the gas holder, an outlet pipe from the gas holder, a purifier box with which said outlet pipe communicates, and a gas outlet pipe from the purifier box.

1,664,179. SAFETY DEVICE FOR GAS METERS. GIORGIO MANGIARACINA, Brooklyn, N. Y. Filed June 17, 1926. Serial No. 116,525. 3 Claims. (Cl. 73—1.)



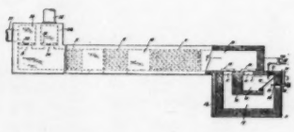
1. In a device of the class described, the combination with a gas meter having a side gas outlet opening into a gas outlet connection, of a tubular member having spaced slots therein, at the bottom thereof, and adapted to be inserted in the said outlet connection, the side portion of said tubular member between said slots being disposed inwardly and extended substantially across the passage therein, and positioned in front of the said side outlet for preventing the insertion of a wire into the said outlet.

1,663,426. GAS VALVE. ERNEST S. TRONZO, Akron, Ohio. Filed June 1, 1927. Serial No. 195,728. 1 Claim. (Cl. 67—115.)



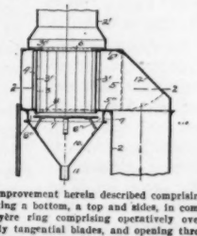
A gas valve of the character described comprising a casing formed from upper and lower semi-circular shaped sections, means for securing said sections in operative association, an inlet pipe threadedly secured to the lower section, an outlet pipe secured to the upper section, a solid portion having a flat upper surface to provide a valve seat and being formed in the lower section, a plate valve member hingedly secured in the lower section and cooperating with said seat for controlling the inlet pipe, a solid portion formed in the upper section and being laterally disposed therein, a disk hingedly secured to the solid portion of the upper section, flexible means connecting said disk with the plate valve member, spring pressed means arranged at an inclination and slidably mounted in the solid portion of the upper section, and said spring pressed means being engageable with said disk.

1,669,172. PROCESS FOR MAKING OIL GAS. CYRUS A. PHELPS, Huntington Park, Calif., assignor, by direct and mesne assignments, of one-third to Albert J. Anderson and one-third to Mary G. Barmore, Los Angeles, Calif. Filed Mar. 26, 1924. Serial No. 701,979. 1 Claim. (Cl. 48—213.)



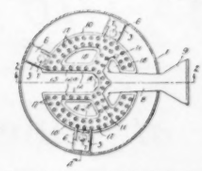
A process for producing oil gas from oil in an apparatus including a checker-brick fixing chamber, including completely burning a portion of the oil with air and with the heat from said combustion heating up the heat retaining checker-brick to a temperature above the reaction temperature of the products of combustion with volatilized and cracked products of the oil, volatilizing and cracking a remaining part of the oil with heat from said combustion, meanwhile maintaining said oil and its cracked and volatilized products completely separate from the combustion and the products of combustion, then mixing the volatilized and cracked products with products of combustion from said burning of the oil, and then carrying the products into contact with the heated checker-brick and thereby fixing the volatilized and cracked products and the products of combustion to produce a uniform combustible gas.

1,663,507. GAS-CLEANING APPARATUS. CHARLES GILBERT HAWLEY, Chicago, Ill., assignor to Centrifix Corporation, Cleveland, Ohio, a Corporation of Ohio. Filed May 4, 1925. Serial No. 27,837. 7 Claims. (Cl. 183—85.)



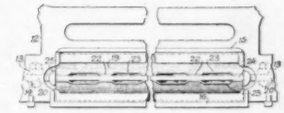
1. The improvement herein described comprising a casing presenting a bottom, a top and sides, in combination with a tuyère ring comprising operatively overlapping substantially tangential blades, and opening through the top and bottom of said casing, a disc centrally positioned at the bottom of said ring and dust receiving means below said disc and depending from the bottom of said casing.

1,662,507. BURNER. CLARENCE H. MORROW, Cleveland, Ohio, assignor to The Hotstream Heater Company, Cleveland, Ohio, a Corporation of Ohio. Filed May 22, 1925. Serial No. 32,101. 4 Claims. (Cl. 158—99.)



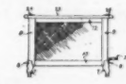
1. A side gas burner for heaters of the type including a substantially vertical pipe, comprising outer oppositely disposed substantially semi-circular chambered portions, and a substantially U shaped chambered portion spaced therefrom and connected thereto, said substantially U-shaped portion having its arms spaced to form an open-ended slot extending from one side of the burner to the central axis thereof for lateral assembly of the burner with the vertical pipe, and a mixture feeding portion having a passage in communication with the chambers of said semi-circular and U-shaped portions.

1,668,612. RADIANT GAS HEATER. JAMES B. SLATTERY, Brooklyn, N. Y. Filed Sept. 17, 1926. Serial No. 136,123. 3 Claims. (Cl. 126—92.)



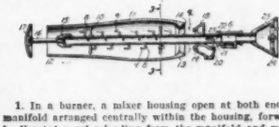
1. In radiant gas heaters, the combination of a hollow body portion having two generally parallel flanges forming a channel in communication with the body portion, alternate sections of the said channel being of different widths, a bar of substantial thickness entirely closing the narrow sections of said channel and dividing the wider sections into two longitudinal outlets, and a radiant supporting base having an oblong aperture of substantially greater width than the said channel and into which the said channels protrude whereby air is fed to all sides of each gas outlet.

1,664,277. GAS HEATING STOVE. WALTER F. ZICK, Alhambra, Calif. Filed July 5, 1927. Serial No. 203,434. 4 Claims. (Cl. 126—92.)



1. A heating gas stove comprising an outer casing composed of sheet metal walls except the front wall, said front wall being partly of sheet metal and partly of wire netting, the back wall having a port therein; a combustion chamber within said casing attached to the bottom wall of the casing and spaced from the back and front walls, said combustion chamber having imperforate back and end and top walls with the front surface of the back portion covered with asbestos wool; a front wall of said combustion chamber being reticulated and covered with asbestos which does not close the openings, the front and back walls of said combustion chamber being spaced further apart at the bottom than at the top; and a burner in said combustion chamber.

1,668,596. GAS BURNER. RICHARD COLBERT MASON, Tulsa, Okla., assignor to The Mason Corporation, Tulsa, Okla., a Corporation of Oklahoma. Filed Sept. 15, 1926. Serial No. 135,580. 7 Claims. (Cl. 158—99.)

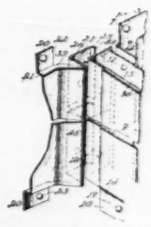


1. In a burner, a mixer housing open at both ends, a manifold arranged centrally within the housing, forwardly directed nozzles leading from the manifold and means for delivering a fluid fuel element into the rear end of the housing for admixture with the fuel element delivered from said nozzles.

1,661,845. GAS-RANGE VALVE AND OPERATING MEMBER THEREFOR. FREDERIC G. NICOLAUS, Cleveland, Ohio, assignor to American Stove Company, St. Louis, Mo., a Corporation of New Jersey. Filed May 8, 1926, Serial No. 107,672. Renewed Dec. 3, 1927. 3 Claims. (Cl. 126—39.)

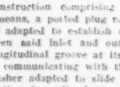
1. A gas stove having a closed structure, a burner and a manifold both embraced within the said structure, the manifold having a valve housing provided with an abrupt taper, a valve correspondingly shaped and fitting the said taper, a lever having its inner end rigidly connected with the valve, said lever projecting through a slot formed in the said housing, the said valve being thus subjected to the heat from the burner, the parts operating as described.

1,663,348. GAS-RANGE CONSTRUCTION. HENRY MOECKER, Jr., Flossmoor, and THEODORE THOMPSON and OTTO HAMMERMEISTER, Harvey, Ill., assignors to American Stove Company, St. Louis, Mo., a Corporation of New Jersey. Filed Apr. 16, 1927. Serial No. 184,278. 12 Claims. (Cl. 126—38.)



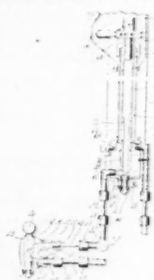
1. A range construction comprising a cooking top having an oven at one side and a splash plate at its rear, a beveled connection between the splash plate and the oven, and the bevel forming said connection being an integral part of said splash plate.

1,663,427. GAS COCK. FRANK L. UHL, Detroit, Mich. Filed July 21, 1927. Serial No. 207,327. 4 Claims. (Cl. 251—152.)



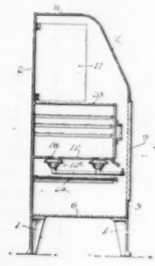
1. A valve construction comprising a body having inlet and outlet means, a ported plug rotatably mounted in said body and adapted to establish or obstruct communication between said inlet and outlet means, said plug having a longitudinal groove at its lower end and a transverse slot communicating with the upper end of the groove, a washer adapted to slide on said plug a stop tooth projecting inwardly from said washer and adapted to slide through said groove into said slot, and means for locking said washer to said body.

1,662,416. OVEN-HEAT REGULATOR. EMIL L. CLAUS, Milwaukee, Wis., assignor to Claus Manufacturing Co., Milwaukee, Wis., a Corporation of Wisconsin. Original application filed Nov. 10, 1923, Serial No. 673,953. Divided and this application filed Oct. 14, 1926. Serial No. 141,542. 11 Claims. (Cl. 236—15.)



1. In an appliance of the character described, a base member, a normally stationary valve member adjustably mounted in the base member and having one end extended upwardly and its other end projected outwardly of the base member, a second valve member cooperating with the first valve member to govern the passage of fuel therepast, a collar member mounted on the projected end of the first valve member, a screw shaft engageable with the collar member and adapted, upon rotation, to adjust the first valve member, and dial means carried by the screw shaft to display the adjustment of said first valve member.

1,661,964. GAS-RANGE CLOSURE CASING. MARY RUDIC, Philadelphia, Pa. Filed Nov. 12, 1926. Serial No. 147,994. 2 Claims. (Cl. 126—37.)



1. A gas range comprising a metallic casing of rectangular form, composed of front and rear walls, and top and bottom plates, mounted on standards above the floor and containing an oven having an open front and hinged door, gas burners located below said oven and a drip pan located below said burners, said casing enclosing all the essential elements of a gas range and forming a gas tight shield therefor, having an outlet for vapor, the rear wall forming the back wall of the oven, and the support for the drip pan, said casing extending above the oven and providing capacious warming spaces above and below the oven and drip pan, said casing having a door in front and an opening in the front wall closed by said door, said compartment being also formed with a door closed opening for access to the space above the oven.

# With *the* Metermen

## Elections Due *at* June Session

AT the May 24 session of the Southern California Meter Association it was announced that the June 28 meeting will be given over partly to election of officers for the coming year. One program feature, either a paper or the showing of a film on the "Story of Natural Gas," prepared by the United States Bureau of Mines, will be arranged for the June meeting, which will be at the Los Angeles Gas and Electric Corporation cafeteria.

Two interesting papers comprised the May program of the Association. J. H. Hill of the Pittsburgh Equitable Meter Company gave a discussion on "The Emco Balanced Valve Regulator," his paper being accompanied by lantern slides. Discussion on Mr. Hill's paper was led by M. J. Cereghino. E. C. Spencer presented a paper on "Measurement of Gas to and from a Natural Gasoline Plant," discussion being led by Kenneth C. Hamilton, Superior Oil Company, and J. J. Delaney, General Petroleum Corporation.

A good beginning has already been made by the Association's committee on a reference hand book, of which Carl W. Brockman, Union Oil Company of California, is chairman. Chairmen of sub-committees which will have an average of four members each have already been appointed on six special subjects, as follows:

"Standard Orifice Meter Installation"—E. C. Spencer.
"Standard Gauge Piping Installation"—E. Lorenz.
"Purification of Mercury for use in Orifice Meters"—Guy Corfield.
"Standard Pressure of 14.3 Pounds, and Correction for Barometric Pressure at Various Elevations"—B. M. Laulhere.
"Specific Gravities on Wet and Dry Gases"—Arthur G. Lindell.
"Derivation of Orifice Meter Coefficients"—H. E. Thompson.

Other subjects and chairmen are being selected.

On Sunday, June 24, again at the Rio Hondo Golf Club, will be played the next Association "blind bogey" golf tourney under the same conditions as usual, and a large number are expected to turn in registration cards for this third golf event.

## *The* Emco Balanced Valve Regulator

*By* J. H. HILL

*Pittsburgh Equitable Meter Company**

THE average regulation problem involves the maintenance of a constant pressure at the outlet of a regulator, even though the inlet pressure and the volume vary. When we reduce from 150 pounds to 50 pounds we know that we must maintain this 50 pound outlet pressure closely even though the inlet pressure drops as low as 60 pounds, or rises to 250 pounds, or more; although there are occasions when we only use a few cubic feet of gas per hour through the regulator, while at other times several hundred thousand cubic feet per hour may pass. This outlet pressure that we are controlling is normally made to act upon a diaphragm which must of course be pressure tight, and sufficiently flexible to move freely in response to the pressure exerted upon it. If we look at the regulators illustrated in Figure 1 we will see that there is provided a diaphragm to which the outlet pressure is directly conducted.

*J. H. Hill*

This outlet pressure must always be balanced by some known and controllable force, and it is usual practice to develop this by weights or springs. In these regulators, we are showing weights mounted on top of the diaphragm to balance the outlet pressure. In normal operation the total pressure under the diaphragm will exactly equal the load imposed upon the diaphragm by the weights. In other words, the pressure per square inch multiplied by the effective area of the diaphragm will give us a force which will equal the weights above.

If the pressure under the diaphragm decreases even slightly, our balance is destroyed, the weights move downward until pressure builds up under the diaphragm to the point where it again balances the weights. We have a system of force balances so that the minute we have an unbalanced force in any direction, movement from an outside source takes place until the balance is again restored.

If we use this system of force balances to operate a valve of any type, we can maintain a constant pressure under the diaphragm. Figure 1 shows a normal pressure regulator working on this principle. If the pressure in the diaphragm chamber decreases the force balance is destroyed temporarily, and the weight causes the diaphragm to move down. This in turn allows the valve to open and a larger amount of gas is allowed to come through, so that the pressure on the outlet side is again built up to its desired point; and the weight is counterbalanced. If, on the other hand, for some reason the outlet pressure tends to increase, this will move upwards against the weight and tend to close the valve, so that by limiting the amount of gas delivered through the regulator, pressure is reduced, and again we have our force balance in the diaphragm head. There may be several ways of applying this force, and oftentimes leverages are used to obtain certain results.

*Presented before the Southern California Meter Association, May 24, 1928.

Figure 1 shows the method of using leverages in our static force balance system.

We find that these balancing forces are quite simple to compute. In the high pressure regulator shown in Figure 1, the diameter of the diaphragm, that is the inside of the case, is 11 inches, so that its area is $(11/2)^2 \times 3.1416$, or 95 square inches. If we want an outlet pressure of 5 pounds per square inch the total upward force will be $5 \times 95$ pounds, or a total weight of 475 pounds. It would be possible of course to pile 475 pounds directly on top of the diaphragm, but it would be so cumbersome as to be prohibitive in practice. We therefore introduce the leverage principle and apply an effective force equal to 475 pounds of dead weight by using a leverage of 10 to one with an actual weight of only 47½ pounds.

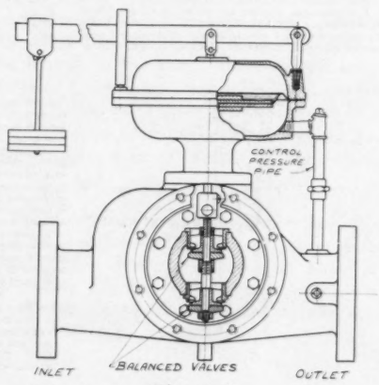



*Figure 1*

If, instead of 5 pounds per square inch pressure at the outlet, we wanted 50 pounds per square inch, it would, of course, be necessary to put on enough weights to hold the diaphragm down; that is, the valve open, until the outlet pressure had built up under the diaphragm to 50 pounds per square inch. For the diaphragm head mentioned above, this amount of weight would be $50 \times 95$ square inches, which equals 4,750 pounds, or, with a leverage ratio of 10 to one, 475 pounds. This, even with a leverage ratio, would be unwieldy and difficult to handle and it would strain the lever, the fulcrum pipe, and the diaphragm to a dangerous point, so in order to keep our weights and forces within reason we must reduce the area of the diaphragm.

There is also the matter of the diaphragm stroke. Sufficient movement must be allowed the diaphragm so that it can open the valve sufficiently to pass necessary volumes of gas. If the diaphragm head is too small, or the material unnecessarily strong and heavy, and therefore stiff, it may not permit sufficient movement, to pass volume. Here is the manufacturers' problem.

We find that for delivery of from 2 to 10 pounds, it is convenient, with the proper leverage, to use an 11-inch diaphragm case:

For outlet pressures of 10 to 20 pounds, 9 inch diaphragm case.

For outlet pressures of 30 to 50 pounds, 7 inch diaphragm case.

For outlet pressures of 50 to 100 pounds, 5½ inch diaphragm case.

For outlet pressures of 100 to 500 pounds, 4 inch diaphragm case.

Naturally, it is the mutual desire of the manufacturer and the gas company to employ as large a diaphragm as feasible in order to get a sensitive response to any slight change in pressure, but there is a physical limitation at this point which must be considered and we cannot have a large diaphragm at the expense of convenience and safety. In actual practice, however, the assorted sizes we have selected as our standard cover the field in an entirely satisfactory manner. These diaphragm heads are interchangeable, and if pressure conditions alter, one size can be substituted for another quickly and conveniently without detaching the regulator from the line.

In connecting the static balance system, the diaphragm, with the variable orifice, the valve, we make a different use of the leverage principle in the low pressure regulator. As only minute fluctuations of outlet pressure are here permissable, the valve must move quickly and positively to the proper opening for the volume necessary to maintain the outlet pressure. This required movement is often so slight that if the diaphragm were called upon to move to only the same degree it would be impracticable. The diaphragm would be thrown into too great movement for the purpose and a surging, or see-sawing of the static balance system would result. Hence, we try in accurate control work on the low pressure regulator to make the diaphragm move a long distance while the valve travels a short distance, and we again have recourse to leverage, but this time inside the regulator body, and operating directly on the valves. This leverage control of the valve movement assures positive and sensitive valve action, prevents see-sawing or pumping, and is particularly valuable at low flows where the valves are barely off the seats. It establishes a lock-up possible in no other way, as a relatively small increase under the diaphragm when multiplied by this leverage develops a powerful shut off force in the valve.

The general principles controlling the size of the head in a high pressure regulator, are equally present to establish the head size of the low pressure regulator, but in this field, as we are handling outlet pressures of a few ounces only, we must have much larger diaphragms. Low pressure heads vary in size from 14 to 25 inches, according to the regulation dsired, and are also interchangeable without disturbing the regulator set-up.

### PRACTICAL MODIFICATIONS

We have considered the general principle of design in the most common type of regulator as well as the theory of operation, but like most mechanical designs, this requires modification in actual performance. That part of the regulator we have called the static balance system, looks quite simple, yet there are certain variations from theory here that must be understood. A theoretically perfect regulator would give a very constant outlet pressure no matter what volume is passing; a regulator set to deliver 40 pounds inlet with a volume of 20,000 cubic feet per hour should maintain precisely 40 pounds outlet pressure if the volume increased to 100,000 feet per hour. However, this is not the case, for with all the normal regulator designs the outlet pressure decreases somewhat as the volume grows. This is unfortunate for just the opposite effect is what we would desire.

This variation from theory is due to the fact that when the volume demand is small the valves of the regulator are nearly closed, and the diaphragm is in a position near the top of its stroke; when the volume demand is large the valves must open to take care of the flow and the diaphragm is down. In the first position of the diaphragm if we study the pressure of gas under it we see that part of the flexible diaphragm material around the cage is not fully susceptible to this pressure as the diaphragm is not contributing fully to support the weights above—some actual force is dissipated in tension of the fabric. Conversely, with the diaphragm down we have in its lower position a fabric curve line which actually gives more support to the downward force of the weights—it is here highly susceptible to pressure from below, which is the counterbalancing outlet pressure of the regulator.

What actually happens is that the area of the diaphragm available for supporting the weights during the stroke, expressed in another way, as the effective area of the diaphragm depends on the valve opening. With the diaphragm in its higher position the effective area is relatively smaller, and it takes a larger amount of pressure per square inch to counteract the weights. With the diaphragm in the lower position due to larger volume delivery, the effective area is relatively large, and it takes less gas pressure to counterbalance the weights. The larger valume position therefore allows the outlet pressure to decrease. This explains many regulator charts.

To minimize this diaphragm effect, we make the area of the diaphragm top pan as nearly the same size as the inside of the diaphragm case as possible, but in all regulators, and particularly those for high pressure, there is a limit beyond which we cannot go in bringing these two diameters together. In low pressure, and also service regulators, where very flexible leather is used for diaphragm material, it is formed and arched in such a way as to reduce this troublesome factor. But the limitation is always there.

These are some of the factors which prevent the manufacturers from developing an ideally perfect regulator. We know in general our limitations, we can tell exactly what our product will do, and our knowledge on this point is always at the service of the gas man if he will only call upon us.

While a slight variation of outlet pressure is of negligible importance in a great majority of standard regulations, in those instances where extreme stability of outlet pressure is imperative the range through which the inlet pressure will vary and the maximum volumes to be encountered should be investigated. From these facts it can be developed approximately what variation in outlet pressure can be counted on. With a standard low pressure district governor, an inch of water variation is unavoidable in going from zero volume to miximum. A high pressure regulator may vary as much as several pounds from zero to higher volumes.

There are quite a few devices whose purpose is to compensate for this diaphragm effect, but as yet they have not met with general acceptance.

It should not be deduced from these very frank expressions that there is anything overwhelmingly difficult about securing satisfactory regulation. We are merely to be understood as suggesting that you determine what regulation you require in a given setup, and make it the manufacturer's business to give it to you. It is our experience that regulators are quite frequently too large for the installation in hand. This is always bad practice.

If a regulator is over size it is frequently operating of necessity with the valve orifices almost closed. In this valve position minute changes of the valve with respect to the seat result in large fluctuations in volume, and accurate control of outlet pressures becomes difficult; not to speak of the pumping and surging movement that is virtually inevitable. A smaller regulator, to obtain the same volume, would lift the valves off their seats, clear of this critical position, and a smoother movement and much greater pressure stability is assured. It is true a longer valve movement will occasion more diaphragm variation, but this is identified by a slow variation in outlet pressure, if indeed there is any at all, and we have none of those uneven and jumping motions associated with over size regulators.

It therefore does not follow that a 10-inch line deserves a 10-inch regulator. This does not mean, however, that the gas company with a line into a growing district must undergo the inconvenience of originally installing a small regulator, and later taking it out to substitute a larger one. All this can be taken care of by a mere change of valve bowls.

If the probable future demands of any district justify a 10-inch line, although the present consumption is light, you can install a 10-inch regulator with an inlet valve bowl having openings of the size ordinarily installed in a two-inch regulator, to take care of your volume in its infancy; as your requirements expand, you can, without removing your 10-inch regulator, make a change in your valve bowl, increasing successively from two-inch openings to four-inch, and then to six-inch, and again to eight-inch, until the arrival of your district at its maturity demands the ultimate insertion of a valve bowl with standard 10-inch valves. In this rapidly growing country where we must look continuously to the future, and build with a view to expansion, this regulator feature is proving most convenient.

### VENTURI CONTROL

All interested in regulation have read, and perhaps discussed, pilot control and venturi control in this connection. Advanced gas engineering demands an automatic boosting device in the regulator itself so that as the volume of gas required through the regulator increases the outlet pressure also increases. We have seen that regulators normally do just the opposite, and allow the outlet pressure to drop off under volume. The desirability of keeping the outlet pressure in district governors as low as possible will be realized when we consider how greatly line leakage increases with pressure. Naturally it is good practice to maintain as low pressure as possible in all district lines during off peak hours; but when the heavy loads come on the pressure at the outlet of the regulator must be increased sufficiently to insure a satisfactory supply of gas at these points most distant from the regulator. All have recognized that an outlet pressure increasing in direct relation with volume would be desirable and a number of devices have endeavored to accomplish this result with varying degrees of success. Many are adapted to a pilot control system and are complicated, hard to service, and uncertain in adjustment; others make use of mechanical leverages as a means of loading diaphragms to increase the outlet pressure. We prefer to lend our endorsement to the venturi principle, and are taking advantage of the increasing velocity through a venturi throat to increase the pressure at the outlet of our regulators under volume demands.

A standard regulator, as illustrated in Figure 2, is equipped with a venturi tube placed in the outlet with a tap set into the

venturi throat at its smallest diameter, and pointing down stream. This creates an artificially low pressure point for our control or breathing pipe system. Another tap is led from our regulator body just before the entrance to the venturi. Here the pressure is naturally somewhat higher. There will be a flow of gas through the control pipe from the high to the low pressure point. By placing a needle valve in the line the amount of gas passing through this control

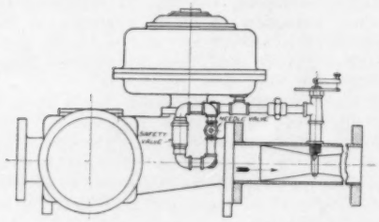


*Figure 2*

line can be varied. A tap is taken from the control line, after the needle valve, and led to the diaphragm chamber. As the volume through the venturi increases the differential between the two ends of this control system will increase, and more gas will pass through it. However, due to the restriction of the needle valve enough cannot get through to maintain the pressure in the diaphragm chamber, and the diaphragm drops to allow more gas to go through the regulator valves and the main venturi. The velocity through the venturi increases until a point is reached where the flow again balances the diaphragm weights. In this way we can get any desirable rate of increase of outlet pressure with volume.

This method is of extreme simplicity and employs only perfectly natural pressure and flow principles without mechanical complexities.

The writer has observed the great interest of students of regulation in the use of pilot control. In many instances this seems to have solved a difficult problem and its use is to be heartily approved. It is a question however, whether pilot control is not being a trifle overworked, and the principle extended into fields and installations where in practice it may not prove thoroughly satisfactory. Many of the set-ups seem complicated in design and operation. Their continued effectiveness appears dependent at times too much upon the maintenances of proper spring tensions, and at other times is predicated upon the perfect functioning of an elaborate mechanism. There is as yet no standardized practice worthy of unreserved endorsement.

# Measurement *of* Gas *to* and *from a* Natural Gasoline Plant

*By* E. C. SPENCER
*California Gasoline Company*

IN the natural gas gasoline industry, the collection, treatment and subsequent distribution of natural gas present as great a variety of metering problems as are met with in any of the industries of an allied nature. Special problems present themselves in conjunction with the various natural gasoline extraction processes. This paper will deal entirely with the measurement of natural gas as it pertains to extraction by the oil absorption method.

*E. C. Spencer*

SEQUENCE OF OPERATIONS

The following is a general outline of the various operations necessary for the production of natural gasoline by the oil absorption method in sequence of their occurrence:

1. Separation of gas and the crude oil as they are produced from the well.
2. Regulation of pressures on the separating equipment or well, or both, which-ever meets with the approval of the operator.
3. Measurement of gas produced by one well or a group of wells.
4. Transmission to the compression plant, usually under a partial vacuum, and final measurement of the co-mingled gas so transmitted.
5. Compression, treatment and return of residual gas to various points of consumption in the field, to meet the demands of field operations.
6. Compression and delivery of surplus residual gas under high pressures, into transmission company's collecting systems.

The first two phases mentioned are very closely related to each other, and the degree of success obtained in one or both, has a marked influence on both measurement and transmission. Incomplete separation of the gas and crude oil produces a great variety of difficulties in measurement; oil-filled gauges and gauge lines, emulsified mercury, deposits of heavy oil and other foreign matter on edge of orifice disc, reduction of pipe area on upstream side of orifice disc, all of which, in the majority of cases, cause erroneous meter records resulting in losses to the gasoline company.

Also, the regulators, check valves, etc., necessary for the proper regulation of pressures at the well, cause a certain amount of trouble. This is especially true of the chattering check valve and the worn out regulator. The immediate answer to this problem is to locate the meter at a point not affected by these pieces of equipment. This cannot always be accomplished in fields where so called town lot drilling predominates, with its attendant lack of space.

The accumulation of liquids in main collecting lines, due to faulty separation, causes excessive pressure drops through reduction of cross sectional area of pipe. The effect on metering, produced by this condition, usually manifests itself in the form of erratic differential and static records, due, of course, to the continual surging of liquids in the main pipe line. Where adequate drips are not installed, an entire system may be affected by this condition All of the foregoing is brought out with a view of bringing to light a few of the difficulties met with in the operation of meters, which can more or less be eliminated through more efficient separation methods and proper design of collecting system pipe lines.

The third phase. The measurement of gas produced by a group of wells, say from three upward, presents no difficulties, because the rate of flow is usually more or less uniform. It is not very likely that three wells will flow by heads simultaneously. The single heading well is a constant source of trouble, extending down through the entire line of metering operations, from meter maintenance to chart reading. The rapidly heading well may, in most cases, be cared for by the simple expedient of installing a mercury bushing in the meter itself. Some investigation into the use of mercury bushings however, leads to the opinion that the record produced on the chart, while it may make for ease in chart reading, very often bears no relation to the actual value passing through the orifice disc. Before accepting the record produced by the use of a mercury bushing, a study of conditions should be made to determine the proper size of orifice disc and mercury bushing necessary to produce the most accurate results. In some cases this may be accomplished by using an auxiliary meter equipped with, say a 30-minute or 60-minute time element and no mercury bushing. By connecting the auxiliary meter in parallel with the bushed meter, a record may be obtained from the auxiliary meter from which one can determine just what combination of disc and mercury bushing is most suitable; still better is the use of 30- or 60-minute records as a guide in calculating the regular 24 hour chart.

The fourth phase. For checking the total volume measured through field meters and for certain necessary information incidental to plant operations, a main line or master meter is used. Of necessity, this meter must be located close to the intake of the compression plant, and if not properly located it may be valueless. The chief course of trouble arises through pulsation induced by compressors, and through liquids accumulated in the collecting mains. A meter installed between two scrubbers, which act also as expansion chambers, seems to eliminate both of these difficulties. The first expansion chamber acts as a scrubber for mist and liquids, the second as a pulsation deadener between the meter and compressors. How effective an installation of this nature would be, under high pressures, is not known to the writer. However, it appears to operate satisfactorily under a partial vacuum.

The fifth phase. The return of residual gas, usually at pressures ranging from 20 to 50 pounds, for field operations does not present the multitude of problems involved in the collection of wet gas under a vacuum. The greatest difficulty, arising through the use of orifice meters for this service, seems to be in keeping the proper size disc installed to measure correctly the varying needs of small boiler installations commonly used in oil field operations. A rugged positive type meter of proper design, and having a maximum capacity of, say 200 M.C.F. per day at the above mentioned pressures, would offer a great inducement to dispense with orifice meters in this service. Naturally, it follows that the cost of such a meter must be comparable to that of the orifice meter. Certain types of volumetric meters now on the market are giving good service on small loads, such as oilwell pumping engines and individual boiler installations, where the maximum volume consumed during any period does not exceed the rated capacity of the meter. Pulsation in the gas as it leaves the compressors is eliminated in the natural course as it

*Presented before the Southern California Meter Association, May 24, 1928.

*Twelve states are represented in this panorama of those attending Southwestern Gas Meter Short Course*

passes through the cooling coils, absorbers, etc.

The metering of surplus residual gas compressed for delivery into high pressure mains, calls for great care in the selection of the proper point for the meter installation, that is, when the meter is located beyond the compressor discharge. Gas, by virtue of its greater density under high pressure, will transmit compressor pulsations a greater distance in a pipe line than it will when subjected to low pressure or a partial vacuum. It is thought that where pulsation exists at a high pressure meter installation, if a constant pressure drop can be maintained at some point between the compressor and meter, the pulsation may be greatly reduced if not eliminated entirely. There should also be sufficient pipe capacity between the compressor and point of pressure drop, to afford a cushioning effect. It is a waste of time and expense to attempt to meter a pulsating flow and the safest course to follow is to eliminate the pulsation and let the meter operate on a flow for which it was designed. Needless to say, where the pressure on a meter is sufficiently great, when calculating volumes some consideration should be given to the compressibility factor, i.e., the deviation in volume from the perfect gas laws employed in the deriviation of orifice meter coefficients. In some cases this is not done and may account for differences in volumes recorded by meters measuring the same flow, but at different pressures.

In conclusion, it may be of interest to give a brief outline of the method generally used in the natural gasoline industry to account for the gas from the time it leaves the well, to its point of consumption as fuel.

The total volume of field wet gas meters are taken as gas received. From this is deducted all residual gas sold or returned for field operations. A further deduction is made for plant fuel and shrinkage due to the gasoline extracted. The balance remaining is the unaccounted-for. This unaccounted-for volume obviously includes line losses, plant losses and a certain amount of shrinkage resulting from the condensation of water vapor precipitated during the process of compression and cooling.

The volume, in cubic feet, per gallon of the various paraffin hydrocarbons ranges from 12 cubic feet for the heaviest to 80.6 cubic feet for the lightest. Those hydrocarbons in combination in natural gasoline usually range from 35 to 40 cubic feet per gallon, which values are used to arrive at the volumetric loss due to the extraction of gasoline

In the case of water vapor, no allowance is made for shrinkage due to condensation during the process of compression. The variation in the amount of water vapor contained in the wet gas is so great as to make it impossible to use a set figure as a basis for the losses sustained. However, it is quite possible to suffer a loss of 2.8 per cent in treating a saturated gas collected at, say 10 inches vacuum and 70° Fahrenheit and disposed of at 30 pounds, and 70° Fahrenheit.

# 316 Register *for* Gas Meter Work *in* Southwestern Short Course

THE fifth annual Southwestern Gas Meter Short Course at the University of Oklahoma, Norman, April 24, 25 and 26, achieved another high mark for attendance with a total registration of 316. Representatives of natural gas companies and manufacturers of gas meters and equipment attended from 12 states. States represented and the registration from each follow: Oklahoma 195; Texas 66; Kansas 14; Louisiana 11; Pennsylvania 10; Missouri 7; Arkansas 6; Iowa 3; and one each from New York, Montana, Colorado and Connecticut.

The Gas Meter Short Course was established five years ago and the attendance has increased each year. It is conducted by the school of engineering of the University of Oklahoma and sponsored by the Oklahoma Corporation Commission and the Oklahoma Utilities Association. A general committee composed of representatives of the university, Corporation Commission, Oklahoma Utilities Association, natural gas utilities and meter equipment manufacturers conducts the school. The personnel of the 1928 committee is: E. A. Clark, chairman, Tulsa, Oklahoma Natural Gas Corporation; W. H. Carson, director, chairman banquet committee, Professor Mechanical Engineering, University of Oklahoma; John H. Baxter, banquet committee, Ada, Southwest Gas Company; F. D. Frank, technical and program committees, Bartlesville, The Empire Companies; Eugene Metz, Kansas City, Missouri, American Meter Company; B. P. Stockwell, chairman publication committee, Bristow, Oklahoma Utilities Company; E. F. McKay, chairman, registration committee, Oklahoma City, Oklahoma Utilities Association; D. C. Williams, Ponca City, Marland Refining Company; C. B. Day, exhibits and banquet committees, Oklahoma City, Oklahoma Natural Gas Corporation; V. M. Cone,. program committee, Oklahoma City, gas engineer, Oklahoma Corporation Commission; F. W. Wright, Dallas, Texas, general superintendent, Dallas Gas Company; A. J. Kerr, chairman, technical committee, Tulsa, Pittsburgh Equitable Meter Company; C. W. Robbins, chairman, program committee, Ponca City, Oklahoma Northern Utilities Company; D. A. Sillers, technical committee, Dallas, Texas, Lone Star Gas Company; and W. L. Crittenden, registration committee, Oklahoma Utilities Association.

A corps of 13 instructors conducted the class room and shop work during the course. A number of papers covering various gas measurement problems were read. Class room instruction was also given on various types of meters, fundamental gas laws and chart figuring, gauges, wet gas measurement, gravity, determination, regulators, flow controllers and other similar subjects. A motion picture on the "Explosion of Natural Gas Holder" at Pittsburg was shown by courtesy of President Rockwell of the Pittsburg Equitable Meter Company.

Wednesday evening, April 26, the annual banquet was held in the McFarland Memorial church at Norman. Reed S. McBeth, Tulsa, director of public relations, Oklahoma Natural Gas Corporation, was toastmaster. Judge W. L. Crittenden, field representative of the Oklahoma Utilities Association, delivered the principal talk and several entertainment features were presented.

The chief purpose of the Southwestern Gas Meter Short Course is to assist gas engineers, metermen, superintendents and other experts in attaining higher and more efficient standards of natural gas measurement and of maintaining and repairing gas measuring equipment.

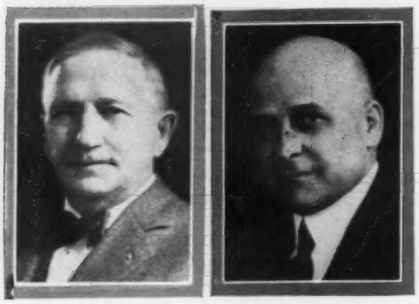
## Natural Gasoline Supply Men *in* Permanent Ass'n

LAUNCHED a year ago as a temporary organization to assist in entertaining delegates to the Natural Gasoline Association Conventions, the Natural Gasoline Supply Men's Association, has now become a permanent organization, dedicated to cooperation with the Manufacturers' Association and to the promotion of better trade relations among the supply companies furnishing equipment to the natural gasoline industry.

The organization took its present form at the May Convention of the Natural Gasoline Association of America, held at Tulsa, when the equipment men elected the following officers: J. H. Satterwhite, Westcott & Greis, Tulsa, president; M. F. Waters, Smith Separator Company, Tulsa, first vice-president; William Schleuter, Refinery Supply Company, Tulsa, second vice-president; W. H. McKaye, Hope Engineering Company, Tulsa, treasurer. A. V. Bourque, secretary of the gasoline manufacturers' association, will serve as secretary of the new organization.

On the board of directors, in addition to the officers named above, are William Cummings, Clark Brothers Company; W. F. Emery, Foxboro Company; William W. Woobank, Woobank Pump and Machinery Company; P. P. McKirahan, Continental Tank Company; and H. A. Trower, Phillips Petroleum Company, who as president of the Natural Gasoline Association of America, automatically becomes a member of the board.

# Dallas Meetings Draw Unprecedented Natural Gas Attendance



*S. W. Meals (left) and Henry C. Morris (right) were elected to the respective offices of chairman and vice-chairman of the Natural Gas Department, A. G. A., at the Dallas convention*

*By* CRAIG ESPY
*Mid Continent Manager*
*WESTERN GAS*

THE Annual meeting of the Natural Gas Department, American Gas Association, the first held since the amalgamation of the Natural Gas Association with the A.G.A. brought close to 2000 people interested in the industry's problems, together in Dallas, Texas, May 7 to 10. This attendance is double the record of any previous gathering of the natural gas men. At the meeting last year approximately 900 were registered.

On the last day of the sessions S. W. Meals, of Pittsburgh, president of the Carnegie Natural Gas Corporation, and vice-chairman of the Natural Gas Department last year, was elected chairman of the Department, succeeding N. C. McGowen of the Palmer Corporation, Shreveport, Louisiana. Henry C. Morris, president of the Dallas Gas Company, and chairman of the arrangements committee for the Dallas convention, was elected vice-chairman.

New members of the managing committee include T. R. Weymouth and R. C. Sharp, Tulsa, Oklahoma; F. L. Chase, Dallas, Texas; Raymond Cross, Columbus, Ohio; H. C. Cooper, T. B. Gregory and J. B. Tonkin, all of Pittsburgh, Pennsylvania. H. L. Montgomery, Bartlesville, Oklahoma is a holdover member of the committee. James H. Dye, Charleston, W. Va., and N. C. McGowen will retire from the managing committee membership. Mr. McGowen automatically becomes a member of the advisory committee of the Department, composed of past presidents.

The first day of the meeting was largely given over to registration, viewing exhibits, and committee meetings. Registration was held in the Manufacturers' building which housed exhibits numbering almost two hundred. Committee meetings were held at the Adolphus Hotel.

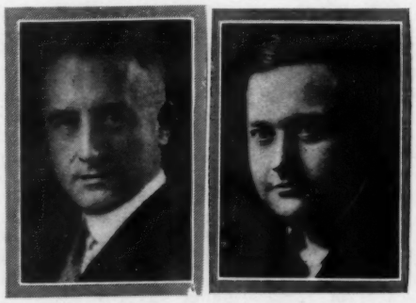
### OFFICIAL OPENING

The annual meeting of the Department was officially opened on Tuesday, May 8th, in the Fair Park Auditorium by N. C. McGowen, Chairman. In his address, Mr. McGowen spoke of the amalgamation of the Natural Gas Association of America with the American Gas Association as having "strengthened both branches of our industry by a unity of thought and action."

He mentioned, as one of the serious problems confronting the industry, and one warranting action, the seeking of gas franchises by irresponsible interests. Mr. McGowen pointed out that through this growing evil, established natural gas investments are often endangered, with no assurance of continued service to territory included in new projects.

Others appearing on the opening morning program were the Reverend Robert S. Chalmers, Dean, Saint Matthews Cathedral, Dallas; R. E. Burt, Mayor of Dallas, who delivered an address of welcome on behalf of the city; and Christy Payne of the Standard Oil Company of New Jersey, who gave a response to the mayor's welcome.

Preceding other addresses scheduled for the morning's program came the appointment of a committee on the chairman's address, by S. W. Meals, vice-chairman of the Department, and a report of the memorials committee, headed by R. C. Sharp.



*Major Alexander Forward (left), managing director of the American Gas Association, and N. C. McGowen (right), last year's chairman of the Natural Gas Department*

The address of Colonel O. H. Fogg, president of the American Gas Association, had next place on the program. This address was read by B. J. Mullaney, vice-president of the A. G. A., and spoke particularly of the combining of the natural and manufactured gas industries into one organization. "Out of this union," he said, "is certain to develop a more valuable national association and a better industry." He characterized the refusal of the gas industry to be satisfied with things as they are, as one of its most stimulating tendencies. "The industry is constantly in search of better methods and new ideas," he said.

Major Forward, managing director of the A.G.A. in his address, dealt primarily with the activities conducted by the Association and the work of the various committees. He paid tribute, as did Colonel Fogg, to the aggressiveness of the Natural Gas Department and the already evident results attending the fusing of the industry's two branches. In closing he entered a plea that the member companies extend cooperation to A.G.A. headquarters whenever called upon for statistical information. "No modern Industry, he said, can exist or play its part in the economic structure of the times that has not a complete knowledge of its own picture."

"The History of Development and Problems of the Natural Gas Industry in California" was the title of the next program feature, a paper prepared by Harrison P. George of the Southern California Gas Company, Los Angeles, and read by Roy M. Bauer of the same company. The paper traced California's natural gas development over the last 18 years. Problems arising from the utilization of natural gas in California, according to the paper, began in 1909 and 1910 when several large wells were completed in the Buena Vista Hills.

In 1912 a 111-mile pipe line was laid from Taft, California to Glendale and in 1913 natural gas was brought to Los Angeles. Due to limited gas supply at this time the natural gas was mixed with manufactured gas made from oil, and later reformed natural gas was also served. In 1927 Los Angeles was put on a straight natural gas basis.

### R. M. CONNER ON LABORATORY

R. M. Conner, director, American Gas Association Testing Laboratory, next pictured the need for gas appliance regulation which led to the establishment of the Testing Laboratory, and outlined the far-reaching results that are being accomplished, not only in equipment approved, but in assistance given to many cities throughout the United States interested in the application of gas ordinances. This is only one of the many indirect results of the establishment.

Following this address the sessions adjourned for the luncheon hour. Each day during the convention a free lunch was served in the rear of the Manufacturers' Building to all wearing a registration badge. The fact that it was not necessary to leave the Convention grounds throughout the day, caused all sessions to be well attended. The same advantage was reflected at the exhibit booths. Throughout the day these were well attended and extremely popular.

Appearing first on the program of the afternon session was H. J. Struth who gave a report on the work being done by the wrinkle committee of the Department.

The first address of the afternoon was read by R. W. Hendee, of the Oklahoma Natural Gas Corporation, Tulsa, Oklahoma, on the subject, "Employees' Performance in the Natural Gas Business." Pointing to the service of the employee who does his part toward maintaining an even gas pressure for the consumer, and as well to the personal service rendered by the employee who is in actual contact with the buying public, Mr. Hendee affirmed that the natural gas industry may congratulate itself upon its loyal, efficient personnel.

"Why a Gas Company Should Merchandise, and How" was the subject assigned to T. L. Phillips of the Union Gas & Electric Company, Cincinnati, Ohio. The gist of the speaker's message was contained in his statement that "to conduct its business on the most satisfactory basis the utility is certainly justified in resorting to the most direct and effective measures, despite the feeling in some quarters that the sale of appliances should be left entirely to the contractors and distributors." He likened the merchandising problem to other business problems. "If you were in any other business," he asked, would you go placidly along and rely largely upon natural development. Many companies are doing this, and through such inactivity they retard the growth of their business and restrict the

sale of more modern and efficient appliances." He compared the good-will obtained through customer ownership to that obtained through merchandising appliances. "Customer ownership is nothing more than selling the utility to its customers," he said. "Similar results can be expected from the sale of efficient, useful gas appliances for the home because of the closer contact with the customer and his realization of the service rendered."

Following the reading of each paper throughout the convention the meeting was thrown open for discussion. Some of these discussions were intense, as in the case of the discussion of proper protection against pipe corrosions, following the reading of the paper on that subject.

### VAUDEVILLE AND SMOKER

The annual vaudeville and smoker, was held in the Junior Ballroom of the Convention Hotel at 8:30 on Tuesday night.

This event filled the spacious bollroom to capacity. Following the program of boxing bouts, musical numbers, and dancing, a lunch was served to those in attendance.

On Wednesday the first paper read before the morning sessions was one on "Limiting Factors for Natural Gas Projects," by P. McDonald Biddison of the Natural Gas Producing Company of Louisiana, Bastrop, La. The praise accorded this paper was generous, both in view of its timeliness and the thoroughness of its treatment. The paper is published elsewhere in this issue.

The second paper of this session was one on Pipe Corrosinn and Protection" by W. G. Hagan of the East Ohio Gas Company, Cleveland, Ohio. This paper stressed the importance of analyzing the character of the soil through which pipe systems are to be extended. The speaker described the process of corrosion, and the most popular methods of protection against corrosion.

The remainder of the day was devoted to the discussion of questions from the Question Box. J. D. Creveling of Henry L. Doherty & Co., New York, acted as Chairman of this discussion.

### BEAUTIFUL BLONDES COMPETE

An innovation, following the afternoon session at which the question discussion was resumed, was a beauty contest to determine the most beautiful blonde complexioned girl in Dallas. The contest was held in the Manufacturers' building and drew approximately 150 entrants from among the Dallas beauties. A gas range was given to the first prize winner and a gas room heater to the winner of second place. Major Alexander Forward, Col. Oscar Fogg, officials of the American Gas Association; John B. Corrin of Pittsburgh; and Col. M. W. Walsh of Louisville, Ky., were the judges.

The annual banquet of the Department was held in the Junior Ballroom of the Adolphus Hotel on Wednesday night. Karl F. Griffith of the Lone Star Gas Company was toastmaster at this occasion and speakers on the program were H. O. Caster, New York; O. H. Fogg, New York; and J. J. Taylor, Dallas newspaper humorist.

The closing day of the Convention was devoted to items of business, committee reports, the election of officers and the reading of additional papers.

A paper prepared by J. B. Best of the Houston Pipe Line Company, Houston, Texas, dealt with "Gas Sands in South Texas." It gave a history of some of the fields and furnished a general outline of the development in South Texas, general geological structure, geological conditions, etc.

E. L. Rawlins, associate natural gas engineer of the Bureau of Mines, Bartlesville, Oklahoma, spoke of the new methods established by the Bureau of Mines for conserving and prolonging the supply of natural gas. in so doing he traced the development of conservation since the time that the finding of gas was considered a menace.

E. O. Bennett of the Marland Oil Company, Ponca City, Oklahoma, delivered a paper on the "Increasing Use of Natural Gas for Oil Recovery and its Economic Effect on the Natural Gas Industry," stating that today the efficient oil producer recognizes gas as the all-important agent in helping him to get his share of oil contained in a subsurface structure into which he may drill. His paper also dealt with methods of production, gas lift wells, pumping wells, activating normally depleted formations, and returning gas to formation.

Among the committee reports presented before the Convention was adjourned was one on the investigative work being done by the transportation committee. This report stated that during the past year this work had consisted largely of making tests on operating pipe lines. Tests have been conducted on 20 pipe lines with diameters varying from 6 to 18 inches, located in Kansas, Oklahoma, Texas and California. The purpose of the investigative work 'is to secure information relative to flow characteristics with which to design pipelines and determine capacity effects."

A report was also read from the gas measurement committee. The work so far, the report stated, has been to "study the orifice meter as commercially produced, under the conditions met with in actual field measurement over the country." The work outlined for the committee this next summer "consists of experiments to determine what change the coefficient of an orifice plate undergoes when the gas measured is under more or less high pressure and hence more dense than it should be according to Boyle's Law."

The committee on final resolutions, in making a report, praised highly those whose cooperation made the Convention such a splendid success. Particular praise in this respect was accorded Mr. McGowen, Mr. Morris, Major Forward, acting secretary Schofield of the American Gas Association, and Secretary William Grant of the Southwest Division of the Natural Gas Department.

For the benefit of the ladies who accompanied the convention delegates many social affairs were held. These consisted of bridge parties, theatre parties, teas, luncheons and automobile tours over Dallas and the surrounding country.

The place of the Department meeting for next year will be decided in October.

## ARTESIA CELEBRATION FOR NATURAL GAS

Citizens of Artesia, New Mexico, are planning a celebration for June 13, when the Pecos Valley Gas Company is expected to complete its line to Artesia. Towns in the valley will be represented in a barbecue dinner and entertainment, one feature of which will be the lighting of a large gas flare.

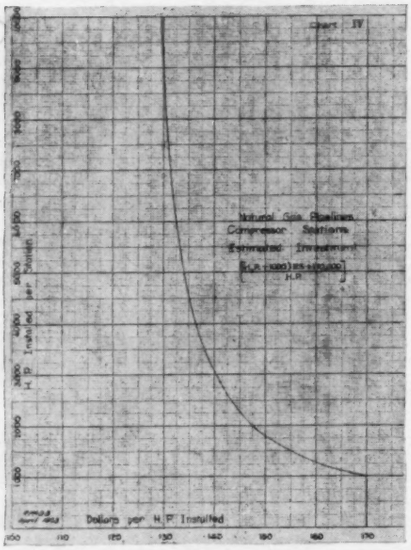
## SO. COUNTIES TO EXHIBIT ADS AT HONOLULU

Southern Counties Gas Company will display an 11-panel advertising exhibit, including advertising copy of the institutional, house-organ, special, and direct-by-mail varieties at the June Honolulu, T. H., Convention of the Pacific Advertising Clubs Association, Public Utility Department.

*A few of the nearly 2000 natural gas men who spent May 7-10 in Dallas, Texas*

# Limiting Factors *for* Natural Gas Projects

*(Continued from Page 21)*




domestic business. The volume of distribution unaccounted for is nearly free from seasonal or daily changes; it has practically a 100 per cent load factor and can be sold by the pipe line company for this reason at lower rates than any other portion of the gas delivered.

### ROSY POPULATION ESTIMATES

The promoter will next go astray in his optimism as to the ratio of consumers to population. This may actually vary through rather wide limits depending upon the size and character of the community. In large cities of predominantly white population it may run as high as 1 to 6, but in smaller communities, agricultural rather than industrial centers in the south, and in general where the negro population is relatively high, no such figure is attainable as is evidenced by results by both manufactured and natural gas installations and by the experience of other utilities. The determination of this ratio requires careful investigation of the particular community to be served and any project is a risky one if such investigation has not been made. The promoter is usually also quite cheerful as to the growth of the communities and predicts a future growth from the past giving no consideration to the factors producing the past growth or to the reasons for expecting a continuance of that growth, although there are indications that the influx of rural population to cities has begun to be reversed.

In his estimates of the volume of industrial sales the promoter is apt to assume the nearly complete conversion of all industrial installations to a natural gas basis. This is seldom possible and then only in localities where the proximity of the supply enables sales to be made at prices well below that of competitive fuels. The competition from powdered coal in large plants close to coal fields is particularly hard to meet and in many instances can only be met on a dump load basis. The prices at which the business will prove profitable will depend upon the volume and load factor. Unfortunately the peak loads of industrial installations usually occur nearly simultaneously; there is a little diversity as to peaks. Further, they usually occur at the peaks of domestic loads and if the industrial load is to be carried as firm business at prices comparable to competitive fuels, capacity must be provided to handle both peaks simultaneously. The idea, however, has been quite prevalent that the equivalent price of competitive fuels could be obtained and yet the business be handled as an off domestic peak load. There are few communities in which the industrial load has a load factor of as much as 80 per cent, and 70 per cent is more apt to be the figure.

If in a community the total yearly sales are S, M.C.F. of which domestic at M per cent load factor and unaccounted for at 100 per cent load factor constitute D per cent of the total, the unaccounted for being X per cent of domestic, and industrial sales on an N per cent load factor constitute I per cent of the total, then since total transportation charges, C, vary but little with variation in load, the relative portions of the total yearly transportation costs that must be borne by each of the three classes is

$$\text{Domestic} = \frac{CD}{(X+1)M} \div \left( \frac{D}{(X+1)\,M} + \frac{XD}{X+1} + \frac{I}{N} \right) \quad 1$$

$$\text{Per M C F} = \frac{C}{MS} \div \left( \frac{D}{(X+1)\,M} + \frac{XD}{X+1} + \frac{I}{N} \right) \quad 2$$

$$\text{Unaccounted for} = \frac{CD}{X+1} \div \left( \frac{D}{(X+1)M} + \frac{XD}{X+1} + \frac{I}{N} \right) \quad 3$$

$$\text{Per M C F} = \frac{C}{S} \div \left( \frac{D}{(X+1)\,M} + \frac{XD}{X+1} + \frac{I}{N} \right) \quad 4$$

$$\text{Industrial} = \frac{CI}{N} \div \left( \frac{D}{(X+1)\,M} + \frac{XD}{X+1} + \frac{I}{N} \right) \quad 5$$

$$\text{Per M C F} = \frac{C}{NS} \div \left( \frac{D}{(X+1)\,M} + \frac{XD}{X+1} + \frac{I}{N} \right) \quad 6$$

For a domestic load factor of 25 per cent an unaccounted for volume equal to 15 per cent of the domestic and an industrial load factor of 70 per cent where the industrial load constitutes 50 per cent of the total yearly sales at city gate these costs per M.C.F. become as follows:

$$\text{Domestic} = \frac{C}{S} \times 1.588 \quad 7$$

$$\text{Unaccounted for} = \frac{C}{S} \times .3973 \quad 8$$

$$\text{Industrial} = \frac{C}{S} \times .5678 \quad 9$$

The combined load factor in the system will be

$$\text{Load Factor} = \frac{1}{\frac{D}{(X+1)\,M} + \frac{XD}{X+1} + \frac{I}{N}} \quad 10$$

In the case assumed above this is equal to 39.7 per cent or the transportation system must be able to handle peak loads equal to over two and one-half times the average load.

Having determined the loads required to be carried considerable latitude may be had in selection of the size line and compression station spacing required to meet the conditions. It will be found in general in laying out systems that it is not economical to compress gas through high ranges of compression. In a flowing pipe line if the outlet pressure be one-third of the inlet pressure the square root of the differences in squares of inlet and outlet pressures is equal to about 94.25 per cent of the absolute inlet pressure and a reduction in outlet pressure to absolute zero pressure (14.7 pounds vacuum) could only increase the flow by 5¾ per cent.[1] Now at three compressions in a compressor (ratio of absolute intake pressure to absolute discharge pressure) there is required[2] 64 horsepower per million cubic feet of gas per day. At four compressions the horsepower per million feet is 84, an increase of 20 horsepower per million cubic feet per day of capacity. On this extra horsepower we would have operating cost about as follows:

| | | |
|---|---|---|
| Labor and Supplies | @ $6.00 | $120.00 |
| Fixed Charges, Taxes Return, Maintenance and Interest 18% on $125.00 | @ 22.50 | 450.00 |
| Total per year on 20 H P additional | | $570.00 |

If the load factor be 39.7 as in the preceding example, then for each million cubic feet of capacity there are 397 M.C.F. × 365 = 144,800 M.C.F. yearly sales on which the added 20 horsepower has increased costs by $570.00 or .3935 cents per M.C.F. on all the gas handled, and if there be two or more compressor stations the increase is two or more times this amount. As applied to increase in capacity of the line between a 3 to 1 and a 4 to 1 ratio, the line capacity has been increased from 94.25 per cent of its limit to 97 per cent of its limiting capacity or has been increased 2.92 per cent at an increase of 31.25 per cent in horsepower. If the line be of 1,000 M.C.F. per day capacity at a 3 to 1 pressure ratio it would then be of 1029.2 M.C.F. per day at 4 to 1 pressure ratio and if with two compressor stations the horsepower would be increased from 128 to 168 at an added yearly cost of $1,140.00. The increased capacity of 29.2 M.C.F. per day on 39.7 per cent load factor would amount to 4225 M.C.F. per year at a cost on the increase for compression of 27 cents per M.C.F.

Adopting a pressure ratio in pipe line design of 1 to 3 the approximate capacities of pipe lines (computed by formula of Thos. R. Weymouth) are given in Table I from which selection of line size for any given maximum load may be made.

The cost per mile of pipe lines may be taken from Charts III-A, B or C which show what may be called relative average costs for three different pressure conditions at three different stresses in pipe walls. The curves for 10,000 pound tensile stress correspond to the highest stress allowable in past practice with usual lap welded steel pipe. The curves for 12,500 pound and 15,000 pound stresses represent what may be hoped for in the future if pipe mills are able to successfully lap weld skelp of higher carbon ratios than present practice[3] or if electrically

1 See Chart I

2 See Chart II Allowance for spare units must be made above these figures

3 See "Improving Line Pipe" Frank N Speller, Oil and Gas Journal June 16, 1927

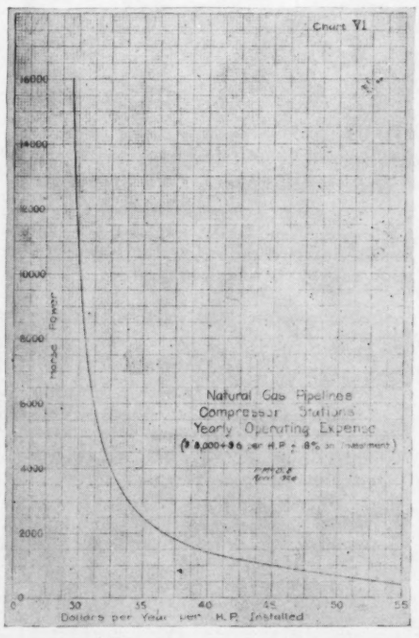
welded pipe of corresponding tensile strengths come into general use as now appears possible. The use of such higher strength steels for pipe manufacture would for markets requiring line sizes over about 12 inches enable natural gas service to be given to communities now entirely beyond reach. The costs as given include allowances for overhead, interest during construction and contingencies. They are not based on either the best or the worst conditions; for territory excessively rough or excessively swampy or for bad rock conditions, additions must be made. Allowances have been made for pipe protection in such an amount as to cover most any type that experience, hope, prejudice or gullibility may indicate to be proper for the particular conditions. Pipe is taken at $90.00 per ton delivered plus $1.00 per inch over 18 inch or under 12 inch. In addition to these costs allowances must be made for all stream crossings requiring multiple lines. These costs may vary through wide limits and on long lines may amount to as much as 10 per cent or more of line cost.

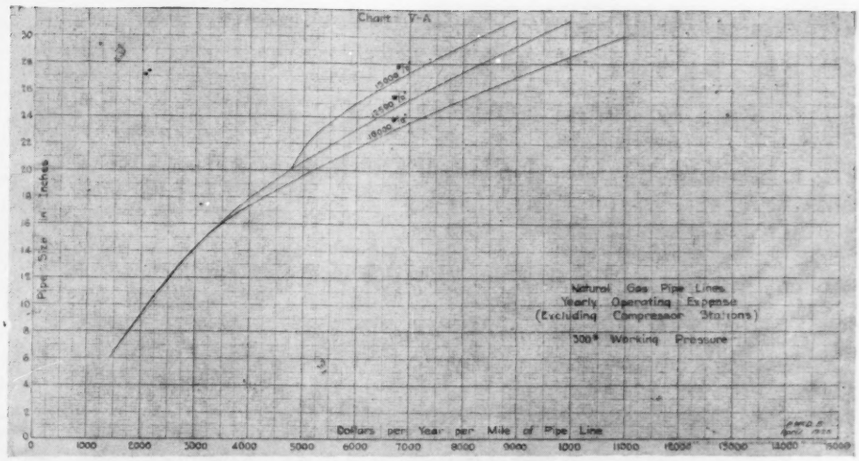
The cost of compressor stations will vary through wide limits, being affected by local water supply conditions, size of plant, whether for temporary field use or permanent line use; and the idiosyncrasies of the designer and builder. The curve on Chart IV gives approximate costs for line stations under average conditions with allowances for overhead. Some conditions may entail higher costs and under some conditions costs may be considerably bettered, but these figures will do for preliminary estimates at present day prices.

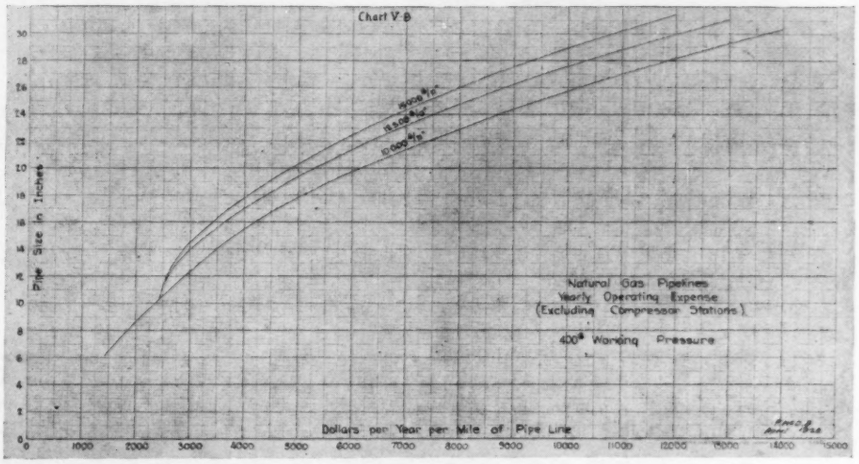
The operating costs of pipe lines may be taken from Chart V-A, B or C and of compressor stations from Chart VI, both of which include labor and supplies, interest, return, amortization and taxes. The total operating costs on a system will then be the sum of the line and station operating expense plus a sum for management which may vary widely, depending upon the scheme of management. It will seldom be less, however, than 75c per M.C.F. and on small projects may exceed 1c per M.C.F. of sales.

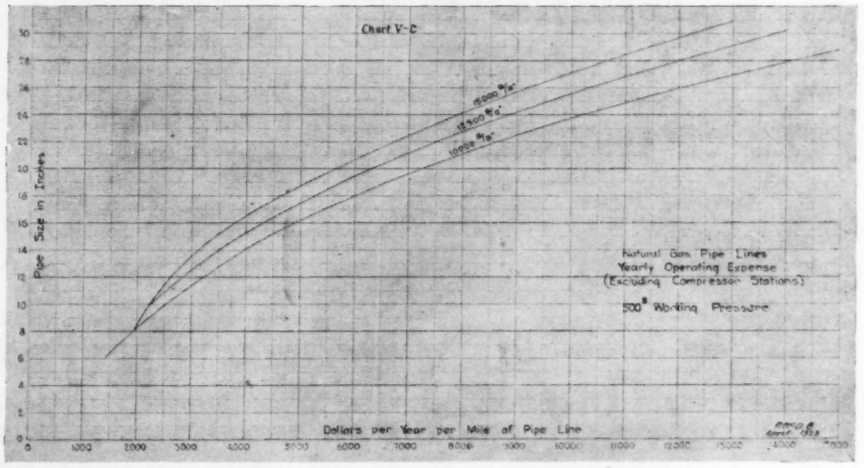
From the above data a quick estimate may be made of the transportation costs on any particular project. To these costs must then be added the cost of gas at the field, and the possible prices at which gas may be delivered at the terminals of a system are obtained. It need not be inferred that all projects which fail by test from the above data are not possible, but those which do not pass will need careful scrutiny and detailed estimating before they can be pronounced sound. In addition after having found the price of delivered gas, due consideration must be given to whether there is enough spread between such delivered price and the retail prices obtainable for the distributing company to eke out an existence. Few if any distribution systems can exist on less than the equivalent of $7.50 per year per customer plus 25c M.C.F. distribution charge on domestic gas and 2c per M.C.F. distribution charge on manufactured gas. If the distributor has a manufacturing plant investment to wipe out he may need $6.00 to $8.00 per year per meter in addition to the above to prevent loss of the investment in the manufacturing plant.

As an example of the use of the data given herein assume a city 300 miles from the gas supply with minimum temperature of 25 degrees and 1000 degree days deficiency per year below 65°F., a population ultimately to

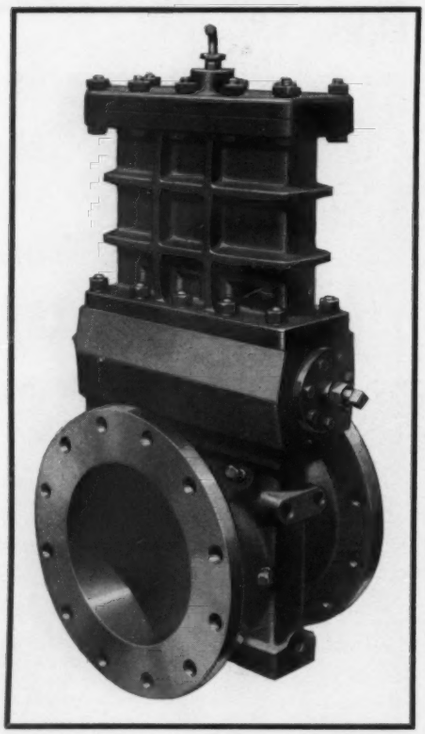


**OVER 8500 IN USE**



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be provided for of 300,000 and a volume of industrial business apparently ultimately obtainable of 7,000,000 M.C.F. per year.

### PEAK LOADS:

DOMESTIC — $\frac{300{,}000}{6}$ = 50,000 Consumers.

(a) Cooking and water heating per meter per day.

$$\frac{25{,}000 \times 1.1}{365} = 75 \text{ C.F.}$$

(b) Space heating per meter per day.
(65–25) 16 = 480 C.F.

Total Domestic Peak—50,000 meters at 555 C.F. ..... 27,750,000 C.F. per day

INDUSTRIAL — $\frac{7{,}000{,}000}{365 \times .70}$ = ..... 27,400,000 C.F. per day

UNACCOUNTED FOR—(See sales below)

$$\frac{307{,}500{,}000}{365} = \text{.....} \quad 843{,}000 \text{ C.F. per day}$$

TOTAL PEAK LOAD PER DAY..... 55,998,000 C.F. per day

### SIZE OF LINES AND COMPRESSOR STATIONS:

From Table 1 an 18 inch line 150 miles between compressor stations has a capacity at 400 lbs. of 54,750 M.C.F. per day. It may be selected for a preliminary set up and pressure raised slightly above 400 lbs. in final design to secure the small additional capacity required for markets, compressor station fuel, and line loss. If stations be spaced 100 miles apart we are still confined to an 18 inch line for the capacity required if we hold to a 400 lb. limit but may use a 16 inch line by using 500 lbs. pressure. By spacing stations about 75 miles apart we can use a 16 inch line at 400 lbs. pressure. To determine the selection let us find the relative costs of operating as follows:

A—18" Line, 300 miles—2—150 mile sections, 2 compressor stations, 400 lbs.

B—16" Line, 300 miles—3—100 mile sections, 3 compressor stations, 500 lbs.

C—16" Line, 300 miles—4— 75 mile sections, 4 compressor stations, 400 lbs.

CASE A—Horsepower required @ 3 compressions (Chart II) is 64 H.P. per million × 56 million or 3584. Allowing for spares install 4000 H.P. per station.

Operating Costs Per Year—

| | |
|---|---|
| Line—300 miles of 18 inch—400 lbs. @ 10,000 lb. Tensile Stress @ $5010.00 per mile (Chart V-B) | $1,503,000 |
| Extras—(See investment) 18% on $500,0000.00 | 90,000 |
| Compressor stations—2 @ 4000 H.P. each @ $32.50 per H.P. (Chart VI) | 260,000 |
| Total Operating Costs Except Management and Gas | $1,853,000 |

CASE B—Horsepower required @ 3 compressions is same as Case A—4000 H.P. per station.

Operating Costs Per Year—

| | |
|---|---|
| Line—300 miles of 16 inch—500 lbs. @ 10,000 lbs. Tensile Stress @ $4950.00 per mile (See Chart V-C) | $1,485,000 |
| Extras—(See investment) 18% on $500,00.00 | 90,000 |
| Compressor stations—3 @ 4000 H.P. each @ $32.50 per H.P. (Chart VI) | 390,000 |
| Total Operating Costs Except Management and Gas | $1,965,000 |

CASE C—Horsepower required @ 3 compressions is same as Case A—4000 H.P. per station.

Operating Costs Per Year—

| | |
|---|---|
| Line—300 miles of 16 inch—400 lbs. @ 10,000 lbs. Tensile Stress @ $4210.00 per mile (Chart V-B) | $1,263,000 |
| Extras—(See investment) 18% on $500.000.00 | 90,000 |
| Compressor stations—4 @ 4000 H.P. each @ $32.50 per H.P. (Chart VI) | 520,000 |
| Total Operating Costs Except Management and Gas | $1,873,000 |

The difference between A and C is small, but C has a slightly larger actual capacity and is selected for that reason.

### INVESTMENT

| | |
|---|---|
| Pipe line—300 miles of 16 inch—400 lbs. @ 10,000 lbs. Tensile Stress @ $25,500 per mile (Chart III-C) | $7,650,000 |
| Compressor Stations—4 @ 4000 H.P. @ $136.50 per H.P. (Chart IV) | 2,184,000 |
| Extras for streams and unusual conditions | 500,000 |
| Total Cost Including Overhead | $10,334,000 |

### SALES

| | |
|---|---|
| Domestic— | |
| (a) Cooking and water heating—25 M.C.F. × 50,000 Consumers | 1,250,000 M.C.F. |
| (b) Space heating—1000 Degrees days × 16 ft. × 50,000 Consumers | 800,000 |
| Total Domestic | 2,050,000 |
| Unaccounted for @ 15% of Domestic | 307,500 |
| Industrial | 7,000,000 |
| Total Sales | 9,357,500 M.C.F. |

### TRANSPORTATION COSTS

| | |
|---|---|
| CASE C— | |
| 300 Miles of 16 inch—400 lbs.—10,000 lbs. line @ $4210 00 | $1,263,000 |
| 16,000 H.P. of Compressors @ $32.50 | 520,000 |
| 18% on $500,000.00 extras | 90,000 |
| Total Except Management and Gas | $1,873,000 |
| Management ¾ cent per M.C.F. on 9,357,500 M.C.F. | 70,100 |
| Total Transportation Costs | $1,943,100 |
| Average Per M.C.F. on 9,357,000 M.C.F. | 20.8 cents |

### TRANSPORTATION CHARGES PER M.C.F. CLASSIFIED

Proportion of Domestic and Unaccounted for sales to total 25.2%
Proportion of Unaccounted for to Domestic sales..... 15.0%
Proportion of Industrial sales to Total sales..... 74.8%

Domestic Load Factor = $\frac{2{,}050{,}000}{27{,}750 \times 365}$ = 20.25%

Unaccounted for Load Factor..... 100.00%
Industrial Load Factor..... 70.00%

Domestic: (Eq. 2)

$$\frac{\$1{,}943{,}100.00}{.2025 \times 9{,}357{,}500} \div \left( \frac{.252}{(.15+1)\ .2025} + \frac{.15 \times .252}{.15+1} + \frac{.748}{.70} \right) = 46.92\text{c}$$

Unaccounted For: (Eq. 4)

$$\frac{\$1{,}943{,}100.00}{9{,}357{,}500} \div \left( \frac{.252}{(.15+1)\ .2025} + \frac{.15 \times .252}{.15+1} + \frac{.748}{.70} \right) = 9.505\text{c}$$

Industrial: (Eq. 6)

$$\frac{\$1{,}943{,}100.00}{.70 \times 9{,}357{,}500} \div \left( \frac{.252}{(.15+1)\ .2025} + \frac{.15 \times .252}{.15+1} + \frac{.748}{.70} \right) = 13.58\text{c}$$

### COST OF GAS AT CITY GATE

To the above must be added the price per M.C.F. in the field The loss in transportation and compressor station fuel having been allowed for in the respective operating cost figures.

TABLE II. PIPE COEFFICIENTS—WEYMOUTH FORMULA

24 Hours—15.2 lbs. Absolute and 60 F.
Sp. Gr. 0.60—Flow @ 40 F.

Pipe Thickness Based on 10,000 lbs. Tensile Stress

| Outside Diameter of Pipe in Inches. | Working Pressure 300 lbs. | 400 lbs. | 500 lbs. |
|---|---|---|---|
| 6⅝ | 116400 | 116400 | 116400 |
| 8⅝ | 237800 | 237800 | 233000 |
| 10¾ | 431000 | 431000 | 417200 |
| 12¾ | 692000 | 682000 | 664000 |
| 14 | 894500 | 873000 | 852000 |
| 16 | 1277000 | 1236000 | 1207000 |
| 18 | 1748000 | 1716000 | 1666000 |
| 20 | 2320000 | 2255000 | 2198000 |
| 22 | 2960000 | 2920000 | 2880000 |
| 24 | 3762000 | 3682000 | 3605000 |
| 26 | 4620000 | 4560000 | 4400000 |
| 28 | 5620000 | 5540000 | 5300000 |
| 30 | 6790000 | 6600000 | 6500000 |

### PAMPHLET ON PIPE JOINTS

U. S. Cast Iron Pipe & Foundry Company, Burlington, New Jersey, has issued a pamphlet describing various types of joints for use with deLavaud cast iron pipe.

### *1928 Calendar*

*Pacific Coast Gas Association, Northern Regional Conference* — Vancouver, B. C., June 6 and 7.

*Canadian Gas Association*—Hamilton, Ontario, June 21 and 22.

*Pacific Coast Gas Association, 35th Annual Convention*—Hotel Coronado, Coronado, California, September 17 to 20.

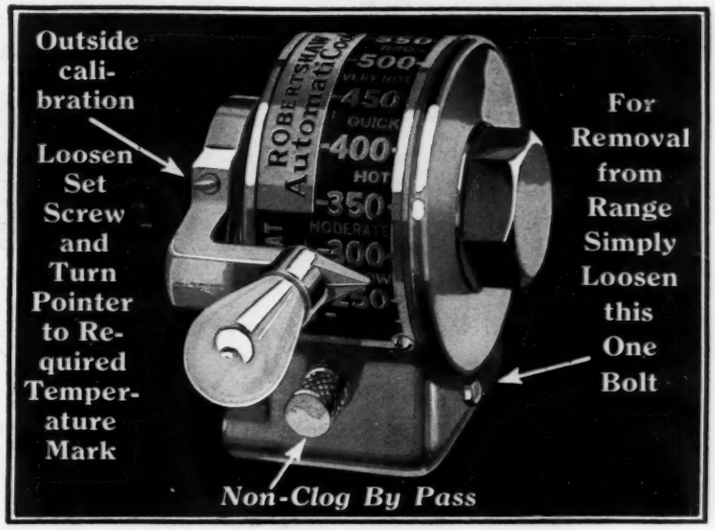
*American Gas Association*—Atlantic City, N. J., October 8, 9, 10, 11 and 12.

# You Should Get Acquainted with the Latest Features

*of the*

## "B" Type

## ROBERTSHAW AutomatiCook




***Outside Calibration*** (*a comparatively late improvement*) Takes just a few seconds to change the temperature setting if required, by means of a convenient set-screw on the temperature pointer. Merely loosen the set-screw, move the pointer to the proper temperature mark on the dial, and then tighten the set-screw.

***Quick Removal*** (*a feature introduced about a year ago*) Should the "B" Type AutomatiCook become damaged for any reason, necessitating replacement, it can be removed without disconnecting the range or disturbing the linings or the piping. Requires no mechanical servicing or repairs on the job. Simply loosen one bolt, replace the Thermostat with a spare and tighten the bolt. The job can be done in less than a minute's time.

***Non Clog By-Pass Pilot*** (*Successfully used for more than a year*) Will not clog nor bind. Always moves freely and maintains its adjustment. Eliminates servicing, adjusted by turning either to the right or left.

***Another Improvement.*** The AutomatiCook is now being equipped with a Raised Non-Corrosive Valve Seat which will resist the corrosive action of gas, eliminating any possible trouble from this source.

***Gas ranges will soon be coming through to you with AutomatiCooks having all these advantages!***

**LEARN THE DETAILS IN ADVANCE**
**WRITE FOR COMPLETE INFORMATION**

If you will also send us the names of all employes handling, selling or installing Gas Ranges, we will be pleased to send them descriptive literature covering these features.

## ROBERTSHAW THERMOSTAT CO.

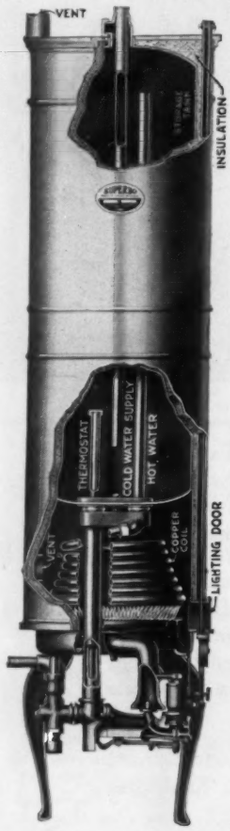
***Youngwood, Penna.***

SUPERBO
AUTOMATIC
STORAGE
WATER HEATERS

*Manufactured in Los Angeles*
*Since 1914*

— — —

**Superbo "Safety"**




**A Quality Product**

**FEATURING: — Dual Safety Control — Detachable Heating Unit—Safety Gas Shut-off.**

No. 1—22 gallons. . . $ 97.50
No. 2—30 gallons. . . 125.00
No. 3—40 gallons. . . 150.00
No. 4—66 gallons. . . 250.00

— — —

**Prices F. O. B. Factory**

— — —

*Manufactured by*

**Superbo Mfg. Co.**

**Los Angeles California**

*Figure 3. First large traveling oven placed in service in Denver*

# Denver Bakers Prefer *to* Use Gas

*(Continued from Page 22)*

rangement, the danger of condensation from the steam pipes dropping on the bread has been eliminated. The oven is 19 feet long, 10½ feet wide and 11 feet high, has 63 trays or travelers, each of which is 70 inches wide and 10 inches deep, accommodating twelve one-pound pans. When operating at capacity, over 1500 one-pound loaves can be handled per hour. Since the oven trays are loaded and emptied at the same point, one man can do this work, while a helper keeps him supplied with dough and removes the empty pans. A conveyor, not shown in the photograph, carries the fresh bread from the ovens to the cooling racks.

The heat required for capacity operation is about 800,000 B. t. u. per hour. The burner equipment, shown in the photograph, consists of five high-pressure gas burners, firing into refractory tunnels placed under the bottom pass of the trays, two on the right-hand side, three on the left. Since this photograph was taken, the burners were changed and 14 smaller burners, seven to a side, have been installed. Five of the seven on each side are at the bottom of the oven, firing into refractory tunnels as did the original quipment, while the other two fire into cast iron tubes, spaced between the second and third tray passes. Suitable baffling gives good heat distribution and enables the operator to control the temperature in any part of the oven. The high-pressure gas for this oven is supplied by a motor-driven positive displacement booster, which is located on the left side of the oven. The outlet pressure of the booster can be varied from 20 inches to 45 inches, as desired, by means of a by-pass regulator. A flue connection at the rear or the oven carries off most of the products of combustion, the hood at the front handling only the small amount which may come out through the charging door.

The first large capacity traveling oven to be placed in service in Denver is shown in Figure 3. This oven is 66 feet long, 8 feet wide and 7 feet high, is single pass and the conveyor, of the plate type, carries the bread the full length of the oven, returning below the bottom row of burners. The burner equipment consists of 64 cast iron pipe burners, of slot and ribbon type, extending all the way across the oven, 42 located above the conveyor and 22 between the upper and return passes. It will be observed from Figure 3 that spacing of the upper burners is comparatively uniform, but about two-thirds of the bottom burners are placed in the first half of the oven. This allows close control of both top and bottom temperatures and a quick heat-up.

Gas is supplied to the burners at a pressure of about three and one-half pounds per square inch by means of twin compressors of the positive displacement type, each driven by a 2-horsepower direct connected motor. Constancy of pressure is maintained by means of a by-pass regulator, built into the base of each compressor. The maximum heat requirements of this oven are slightly less than 1,000,000 B.t.u. per hour. Temperature regulation is done manually. To facilitate accuracy the oven is equipped with two adjustable baffle plates which divide the oven into thirds. Steaming is done in the first third. Six pyrometers, mounted at important points throughout the oven are connected to a centrally located indicator by means of a multi-point switch, allowing the head baker to get whatever temperature adjustment required. In normal operation, this oven turns out 1500 loaves per hour, with a baking period of 35 minutes. Three men are regularly used to handle the oven, one charging and two taking care of the bread as it reaches the discharge end.

One special feature of this oven is the safety pilot system. A high frequency generator, with multiple contact distributor, supplies high voltage electricity. A spark gap is arranged at each burner in such position that the spark will jump across the burner flame path. The distributor handles successively small groups of burners, producing a spark at each, which is ample to ignite the burners. This sparking is maintained at all times when the oven is in operation.

---

The Foxboro Company, Foxboro, Mass., has established a branch office at 2104 Magnolia Building, Dallas, Texas. J. B. McMahon, the district manager, will have as his associates R. L. Mallory, and C. L. Bryan. The Dallas territory includes the States of Texas and Louisiana, and the southern sections of New Mexico and Arkansas.

# Arizona Utilities Men Hold Record Convention

THE Arizona Utilities Association annual convention and joint meeting with the Pacific Coast Gas Association and the Pacific Coast Electrical Association, held at Prescott, Arizona, April 26, 27, and 28 in the new community owned Hassayampa Hotel brought out a record breaking attendance of 125 delegates from the states of Arizona, California, Colorado, New Mexico, and Texas.

The program began Thursday morning, April 26 with the registration and the president's annual address by W. C. Hornberger, who outlined the history of the association, its work, and its hopes for the future.

At the noon luncheon, Hon. E. C. Seale, mayor of Prescott, gave a short address of welcome which was answered by M. A. Pooler, Tucson Gas, Electric Light & Power Company.

Two of the papers given at the Arizona meetings, of particular interest to gas men, are published in this issue of *Western Gas*. These are H. E. Davidson's discussion on "Getting New Business on Existing Mains," and the paper by A. R. Bailey on "Practical Present Day Distribution Methods."

Officers selected for the ensuing year at the afternoon session of Friday are president, M. A. Pooler, Tucson Gas, Electric Light & Power Company; first vice-president, L. V. Seares, The Arizona Power Company, Prescott; second vice-president, A. F. Moriarty, Central Arizona Light & Power Company, Phoenix; directors, W. C. Hornberger, Arizona Edison Company, Phoenix; Geo. T. Herrington, Flagstaff Electric Light Company; A. N. Jones, Upper Verde Public Utilities Company, Clarkdale; T. K. Quigley, Yuma Utilities Company; Executive Secretary, Milton G. Sanders, Phoenix.

## LOS ANGELES COMPANY HAS COOKING CLASS PROGRAM

A new series of free cooking classes for the public has been inaugurated by the Los Angeles Gas and Electric Corporation. These classes, which are being held in the utility's main office building, are under the general direction of Miss Jessica Taylor, who is in charge of the company's extensive appliance display. The classes meet every Monday, Wednesday and Thursday afternoon from 1:30 to 4:00 o'clock.

In putting on the cooking schools the corporation has the assistance of a number of leading range manufacturers, whose products are being used by the several well-known cooking experts of Southern California who are conducting the classes. All of the ranges used are Blue Star products.

## BABCOCK FLIES TO KEEP SALES ENGAGEMENT

C. B. Babcock, president of the C. B. Babcock Company, San Francisco, took airplane from that city to Los Angeles on May 17 to attend a sales meeting of the Southern Counties Gas Company.

## GAS PROVISIONS WRITTEN INTO PASADENA ORDINANCE

Effective April 28th, the City of Pasadena, California, adopted provisions of the Los Angeles furnace ordinance into its building code. The purpose of the furnace ordinance is to secure adequate installation of furnaces. Pasadena also adopted the same gas appliance venting ordinance which is in effect in Los Angeles.

**We are now prepared to furnish**

**Reliance Balanced Valve Regulators**

**In sizes up to four inch for both high and low pressure delivery.**

**It will be interesting and profitable to you to investigate the merits of this new device.**

**Reliance Manufacturing Company**

**ALHAMBRA, CALIF.**

**A full line of Air and Gas Equipment**

| | |
|---|---|
| Air Compressors | Cameron Pumps |
| Portable Compressors | Gas Compressors |
| Pneumatic Tool | Rock Drill Equipment |
| Turbo Gas Boosters | Oil Engines |

**Ingersoll-Rand Company**

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Branch Offices and Service Stations the World Over

**Ingersoll-Rand Company of California**

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THE NEXT TIME YOU ARE UP AGAINST A TOUGH PAINTING OR MAINTENANCE PROBLEM, CALL IN AN ARCO MAINTENANCE ENGINEER. LET HIM TAKE THE BURDEN OFF YOUR SHOULDERS. HE WILL SAVE YOU TIME, EFFORT AND MONEY. MAY WE SEND YOU COMPLETE INFORMATION?

*THE ARCO COMPANY*
*CLEVELAND, OHIO*

Pacific Coast Branch—
523 Rialto Building
San Francisco, Calif.

(160)

ARCO

Paints . Varnishes . Enamels . Lacquers

# Southwestern Public Service Association Meets *in* Thirty-third Annual Convention

THE thirty-third annual convention of the Southwestern Public Service Association, which met at the Baker Hotel, Dallas, Texas, May 2, 3, 4, and 5, registered an attendance of 625, many of those present coming from distant points in the Southwest to attend the sessions. While there was a goodly sprinkling of gas men among this group they did not turn out in such strong numbers as in previous years, due to the fact that the Natural Gas convention was being held in Dallas the following week.

### OFFICERS FOR NEW TERM

New officers installed on the last day of the meeting were: President, W. H. Burke, Southwestern manager, Stone & Webster, Inc., Houston, Texas; first vice-president, chairman gas section, R. A. McNees, assistant superintendent gas department, San Antonio Public Service Company, San Antonio, Texas; second vice-president, chairman electric section, H. O. Clarke, Jr., assistant general manager, Houston Lighting & Power Co., Houston, Texas; third vice-president, chairman railway section, James P. Griffin, vice-president, Texas Electric Railway, Dallas; treasurer, R. G. Soper, vice-president Dallas Gas Company, Dallas. E. N. Willis was re-elected secretary.

Those serving on the executive committee for the coming year, in addition to the officers elected, are M. T. Walker, outgoing president of the organization; P K. Baker, D. S. Caldwell, H. C. Morris, A. F. Townsend, E. S. Myers, E. B. Neiswanger, W. B. Tuttle and W. H. Thompson.

Morning sessions of the convention were held in the Crystal ballroom of the hotel and were general in appeal. Afternoons were devoted to the special sectional meetings, there being four divisions meeting simultaneously, the railway section, gas section, electrical section and accounting section

### GAS DISCUSSIONS

The three talks provoking the most discussion before the gas sessions dealt with "House Heating," "Unaccounted for Gas" and "Recent Developments in Joints for Pipe."

R. M. Redding, chief engineer of the Dallas Gas Company, led the discussion on house heating, bringing out in his introductory talk the influence of househeating on sales and rate structures and its effect on the operating load of the gas company with respect to minimum and maximum loads.

J. Woodward Martin, chief engineer of the Muicipal Gas Company, Dallas, spoke on unaccounted for gas under the headings, components of unaccounted for gas, methods of reducing the unaccounted for and maintaining it at the minimum, and methods of expressing the amount of unaccounted for gas.

H. Y. Carson, consulting engineer, Birmingham, Alabama, addressed the group on recent developments in joints for pipe. His talk related the history of pipe joints and experiments which had been conducted on packing materials used in connection with the joints. He also spoke of the work that has been done by the technical committee of the Southwestern Public Service Association in regard to the use of rubber rings in bell and spigot pipe joints.

Major Alexander Forward, managing director of the American Gas Association, also tending a special invitation to the gas men addressed the group at one of its sessions, exto remain in Dallas for the natural gas convention, May 7 to 10.

## B. C. ELECTRIC SALESMEN FIND MARCH GOOD GAS MONTH

Gas appliances amounting in value to $17,106 were sold by salesmen of the gas department of the B. C. Electric Railway Company during the month of March. Officials of the department estimate that the gas consumption of these appliances will give an annual revenue of $8,872. In all, 139 gas ranges, 50 hot plates, 48 water heaters, 10 auto water heaters, 66 gas fires, three furnaces, 16 industrial burners, one vacuum heating system, 18 kitchen heaters, 2 thermostats, 4 radiators, 2 bake ovens and a number of small miscellaneous appliances were sold at the two showrooms of the company in Vancouver and the one showroom in New Westminster.

## EIGHTH CAMPAIGN ON FOR CITIES SERVICE SECURITIES

The Gas Service Company began its eighth customer-ownership campaign on the 14th of May, the drive to continue until Thursday, May 24. The Securities being offered are Cities Service Preferred, Cities Service Common, Empire Gas and Fuel 6½ per cent Preferred, and Cities Service 5 per cent Refunding Debentures.

## CELEBRATE NATURAL GAS OPENING IN GREAT FALLS

On May 2 approximately 10,000 persons gathered to celebrate the official opening of natural gas service through the mains of the Great Falls Gas Company, Great Falls, Montana. Lighting of a 45-foot torch was the official symbol for the opening of service, and Mayor Harry D. Mitchell, A. H. Sikes, manager of the gas company and others prominent in the community participated in the program. To commemorate the introduction of the new fuel the Great Falls Leader issued a 10-page "Natural Gas Edition" in two colors, congratulating the Great Falls Gas Company, the Hope Engineering & Supply Company which laid the lines, and the City of Great Falls, upon completion of the important task.

Servicing of all gas appliances in the city is going forward through the efforts of a special crew, and will be complete within a month.

R. B. Meredith, vice-president of the Great Falls Gas Company, and E. R. Foster, rate and valuation expert, arrived from Chicago in time for the natural gas celebration.

## TEXAS-LOUISIANA POWER CO. IN LARGE PURCHASE

A. P. Barrett, president of the Texas-Louisiana Power Company, has announced on behalf of his company the purchase of the properties of the Texas-Gulf Power Company. The Texas-Louisiana Power Company, with headquarters in Fort Worth, Texas, operates properties in Texas, Louisiana, Oklahoma, New Mexico, Arizona and Kentucky. The Gainesville, Texas, Gas Company, was involved in the consolidation.

## 110 LONE STAR FOREMEN IN SEMI-ANNUAL MEETING

ONE hundred and ten foremen of the Lone Star Gas Company assembled at the headquarters of the company in Dallas on May 7 for the semi-annual meeting of that group. The morning was devoted to a program of talks, each of which was followed by discussion. The afternoon was given over to the discussion of specific problems.

The morning program embraced a discussion of cooperation, leakage, neatness and appearance of properties, accidents and prevention; a talk by R. A. Minter, office engineer of the company, and another by A. W. Breeland, chief clerk of the operating department.

F. E. Byrne, general foreman of the Fox Field in Oklahoma near Healdton, spoke at the morning meeting on the subject, "Cooperation," J. A. Martin, superintendent of transportation of gas for the Lone Star, on "Leakage," and C. W. Cardwell, chief engineer of the Gas City Compressor Station near Duncan, Okla., on the subject, "Neatness and Appearance of Properties." M. J. McCombs, manager of the department of safety, Employers Casualty Co., and Texas Employers Insurance Association spoke on "Accidents and Preventions."

R. A. Minter,, office engineer of the Lone Star, and A. W. Breeland, chief clerk of the company's operating department, also spoke at the morning sessions. Mr. Breeland had charge of planning the meeting.

## SOUTHERN COUNTIES SALES MEETING

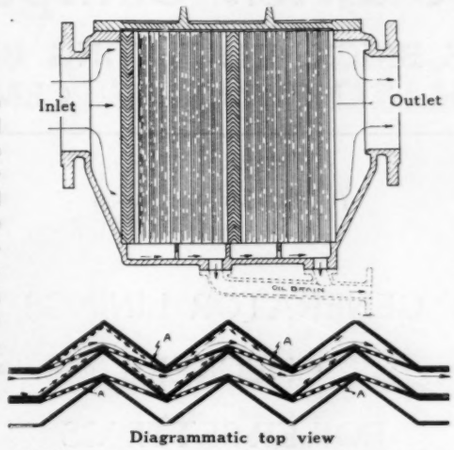
On May 17 the Southern Counties Gas Company held a sales meeting in Los Angeles at which Clyde H. Potter, recently returned from an extensive trip of inspection of utility sales departments and gas appliance factories, spoke to company salesmen, giving a review of high lights of his trip. Other speakers at the meeting were Frank Bivens, a vice-president of the company, C. L. Rutledge, district manager for Orange County, and C. B. Babcock, president of the C. B. Babcock Company. There were 60 present at the meeting.


Install

**PIONEER SEPARATORS**

For Removal of All **DIRT AND MOISTURE**

From **MANUFACTURED GAS** Pipe Lines




**The 10 in. size has 56 separated vertical streams which pass over enormous and effective baffle surfaces, ensuring 100% purification of each and every stream, independent of the adjacent streams.**

**The 10 in. size has 1680 separate catch pockets with vertical drains, and the Gas Stream changes its direction of travel, velocity and shape 8400 times.**



**Diagrammatic top view**

of Pioneer Separator showing principle. The thin, long arrows indicate the flow of the steam, air, gas, etc. The heavy short arrows show the flow of extracted impurities. Letter A indicates catch pockets.

**PIONEER EQUIPMENT CORPORATION OF AMERICA**

231 BROADWAY NEW YORK

General Representative for California

H. PLUMMER, 806 FIFE BUILDING SAN FRANCISCO


## FIFTH MILHAM WELL HAS 20,000,000 CU. FT. FLOW

Milham Exploration Company has completed well No. 5 in the Buttonwillow district, California, with a flow of 20,000,000 cubic feet of gas from a depth of 2,716 feet, the pressure being 1000 pounds. The company now has a potential outlet of 75,000,000 cubic feet from its five wells in this district.

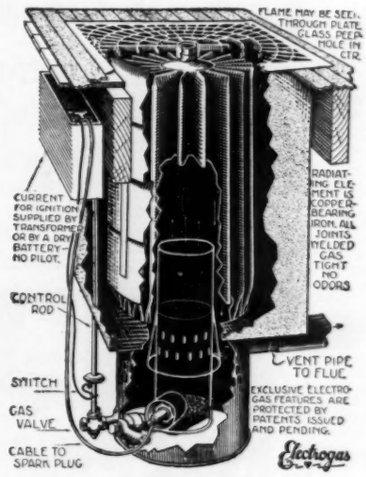
## FURNACE ASSOCIATION EXHIBITS IN MUNICIPAL PAGEANT

In the picture above is shown a float entered by the Gas Furnace Association of Southern California in a municipal parade staged in Los Angeles in May to mark the official dedication of the community's new $6,000,000 City Hall. The truck, loaned by the Los Angeles Gas and Electric Corporation, was preceded by a float showing "The Basement of Yesterday," with an old disreputable coal furnace surrounded by coal, papers, ashes, etc. On the truck illustrated above were three modern gas furnaces, located just behind the A. G. A. seal, this exhibit being entitled "The Basement of Today."

The Los Angeles Department of Building and Safety won a silver cup for having the most representative number of exhibits among the more than 300 floats in the parade.


**ELECTROGAS**

*it's matchless!*


FLAME MAY BE SEEN THROUGH PLATE GLASS PEEP HOLE IN CTR.
CURRENT FOR IGNITION SUPPLIED BY TRANSFORMER OR BY A DRY BATTERY—NO PILOT.
RADIATING ELEMENT IS COPPER-BEARING IRON. ALL JOINTS WELDED GAS TIGHT NO ODORS
CONTROL ROD
SWITCH
GAS VALVE
CABLE TO SPARK PLUG
VENT PIPE TO FLUE
EXCLUSIVE ELECTROGAS FEATURES ARE PROTECTED BY PATENTS ISSUED AND PENDING.
Electrogas

—a good floor furnace
—approved by A. G. A.
—three sizes

ELECTROGAS FURNACE CO.
(Kauffman-Norton-Fairchild Co.)
RIALTO BLDG.
SAN FRANCISCO

# Stockton Fire Brick Company

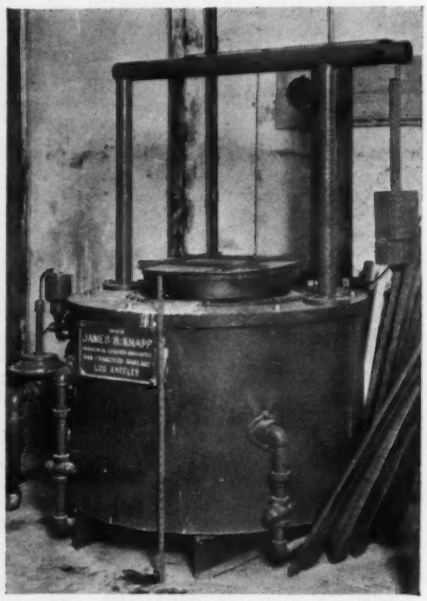
**FIRE BRICK, INSULATING BRICK**
**HIGH TEMPERATURE CEMENT**

*High Grade Refractories*
*for*

GENERATOR LININGS
CHECKERS
BOILER SETTINGS

OFFICE:
Russ Building,
San Francisco

WORKS:
Stockton,
California

*Circular pot type furnace*

## Now We're *in the* Air

*(Continued from Page 25)*

tages which, although not absolutely essential, are highly desirable and are included in the bargain when this fuel is chosen.

The furnace used by the Prudden San Diego All Metal Airplane Company is of the circular pot type of hardening furnace. It consists essentially of the steel outer shell containing the insulation material and the fire brick lining. The pressed steel pot containing the hardening compound is 16 inches in diameter and 16 inches deep. It is supported by the usual flange which rests upon the cast iron top of the furnace. Four tunnel-type burners fire tangentially into the combustion chamber around the pot.

The vent connection is placed at the bottom of the combustion chamber and leads into a six-inch steel pipe which is vented to the atmosphere about six feet above the floor.

The mixture of gas and air is produced in a proportional mixer, the air being forced into the mixer by a centrifugal blower driven by a one-third H.P. motor.

The furnace is lighted in the usual manner and consumes the full capacity of gas until the required temperature is attained. At this point the air supply is diminished by the action of a potentiometer controller and a diaphragm-solenoid type of control valve. The amount of air which passes into the proportional mixer governs the fuel consumption and is so regulated that the temperature of the pot will remain practically constant.

Duralumin is an alloy of aluminum and copper, a typical analysis being as follows:

| | | |
|---|---|---|
| Al | 93.80 | Per Cent |
| Cu | 4.05 | " " |
| Mn | .60 | " " |
| Mg | .55 | " " |
| Fe | .63 | " " |
| Cr | .11 | " " |
| Si | .26 | " " |

The metal comes to the aircraft manufacturer in the form of sheets, tubes and rivets in the soft or annealed form. After cutting or shearing to the proper shape for the particular part for which it is intended the metal


**The M-J-L Automatic Fire & Damper Control**

A highly efficient and reasonably priced regulator for controlling oil or gas fires together with stack damper. The damper is controlled in perfect synchronism with the fire. Assures proper combustion at all times and maintains constant steam pressure under a variable load

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922 S. Hemlock TUcker 1916 Los Angeles

**The Cleveland Trencher Company**

**"Pioneers of the Small Trencher"**

**20100 ST. CLAIR AVE.**
**Cleveland, O., U.S.A.**

is rolled into a coil of such a size as to permit it to be placed in the pot of the hardening furnace.

The coil of duralumin remains in the hardening compound at a temperature of 920° Farenheit for 20 minutes, after which it is removed and quenched immediately in cold water. Rivets and small parts are introduced into the bath in perforated steel containers.

Because of the phenomenon of delayed hardening peculiar to the alloy, the shaping may be done after the hardening process. However, hardening begins in about an hour after the metal is removed from the furnace and quenched, and continues for several days. At the end of approximately four days the maximum hardness is attained.

The physical characteristics of the hardened alloy are approximately as follows:

Ultimate Tensil Strength
55,000 pounds per square inch
Elongation 20 per cent
Specific Gravity 2.788 to 2.791
Hardness 26-28 Scleroscope.

As a material for aircraft construction it is ideal, and when properly treated it gives far greater strength in proportion to weight than any other known material. The entire framework of the fusilage, wings, wing spars, alerions, and tail assembly of the Prudden ship is made from duralumin and the whole plane is covered with a corrugated duralumin "skin" in place of the usual fabric. The power plant consists of three nine-cylinder, radial type motors manufactured by Siemen-Halske of Germany and which develop a total of 375 horsepower. There are accomodations for six passengers and the pilot in the inclosed cabin.

## Combatting Corrosion *by a* New Means

*(Continued from Page 23)*

ence of the metal particles. When properly applied the coating may be scraped or filed down to the steel without any signs of peeling off. To all intents and purposes it is as homogeneous as if welded to the steel.

The Portland Gas & Cake Company has applied lead coatings to a 20,000 gallon tank used for receiving benzol after chemical treatment and a scrubber used for washing smoke containing sulphur dioxide. As this article is being written an oxide purifier is being prepared for coating. Some sheets of the combustion chamber of a househeating gas furnace have also been coated with Monel metal and are now under test.

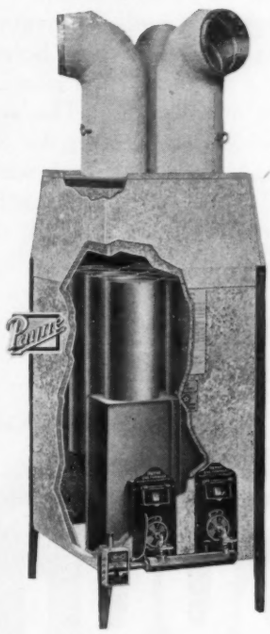
In order to reduce the cost of sandblasting the surface of apparatus which is already corroded it is necessary to remove all loose scale, tar etc. This can be done by scraping or wire brushing. To attempt to sandblast with a heavy scale on the steel plates results in excessive dust which makes it impossible for the operator to see and also increases the consumption of sand.

Ordinary river sand is not suitable for sandblasting as it breaks up into dust too readily. A sharp silica sand which must be quite dry is best.

PROTECTING THE OPERATOR

The operator is protected by means of a helmet and mask which covers the entire head and face. In front of the eyes is a fine mesh wire gauze; a small house connected to the compressed air line keeps a current of air blowing out through the gauze and prevents the entrance of dust.

The friction of the sand in the hose and nozzle produces static electricity and to pro-

STRENGTH AND DURABILITY

Special rust-resisting iron used in their manufacture has made these qualities paramount in

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They have also been proven through fourteen years of satisfactory installations.

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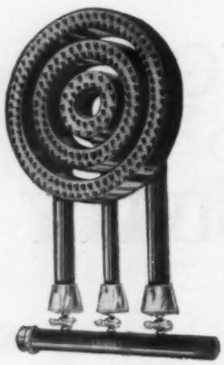

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## No. 60 BCE

# Ring Burners

These burners are made up of three independent burners which can be used singly, in pairs, or in triple. They are made of heavy cast iron, with two rows of raised port holes. A perfect supply of secondary air is supplied to each flame port. This insures perfect combustion and prevents overheating. The air and gas are delivered through the improved Johnson Venturi Air Mixers and Tubes, and heavy A. G. A. Type Valves equipped with the Johnson Patented Direct Jet Regulator. The result is much higher flame temperature. Please state your requirements and full details relative to that particular application will be gladly furnished.

JOHNSON GAS APPLIANCE CO. Cedar Rapids IOWA

Pacific Coast Representative—C. B. Babcock Co.

135 Bluxome Street San Francisco, California

If you can't afford to extend your lines use

# ROCKGAS

Hold your potential customers by giving them temporary service with ROCKGAS in territories where you are not yet ready to extend your lines. Or permanent service where extension of lines is impractical.

**ROCKGAS**
**a pure natural gas**

—liquified under pressure in convenient sized tanks. Smallest, 12x37 inches; holds equivalent of 2666 cu. ft. 500 B. t. u. gas. Largest, holds equivalent of 36,550 cu. ft. 500 B. t. u. gas. Other sizes to meet any requirements.

ROCKGAS now used and endorsed by homes, camps, stores, etc., throughout the United States.

*A few rich California tierritories open for distributors. Write today for full details.*

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3190 Walnut St.
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Long Beach, Calif.

# SOUTH CHESTER STEEL PIPE

**Excels for Gas Service**

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

**SOUTH CHESTER TUBE CO.**
Chester, Pa.


tect the operator from shocks the hose and nozzle must be properly grounded. Special hard cast iron nozzles with holes 3/16 inches in diameter have been found best, but even these wear out after a few hours use.

The protection of the operator of the Metalayer is also most important, especially when applying lead, on account of its poisonous nature.

A regular army type mask giving complete protection to the face and equipped with a hose with inlet provided with a funnel located to windward and well away from the work is best. When coating tanks an exhaust fan of high capacity with suction connected to lower manhole which will create a good draft is advisable both in sandblasting and metalaying. Opeartors must be careful to wear gloves and thoroughly wash their hands before eating and to have overalls washed at frequent intervals.

When applying metals, such as Monel, of higher melting point the protection is not so important as there is little or no evidence of metal being given off into the surrounding atmosphere.

While the Portland Gas & Coke Company has not as yet any direct evidence of the length of life of this type of protective coating as the process has only been used for a few months, every confidence is had that it will be a means of greatly prolonging the life of some of the company's apparatus. Samples of steel plate coated with lead have been tested in the laboratory with strong acids without showing any action

The manufacturers of the Metalayer claim that it can be used not only for the application of protective coatings, but that surface defects in castings may be filled up and coverings of copper or other metals applied to such equipment as printing press rolls to a thickness of 3/16 inches or more, the metal being entirely homogeneous so that it can be subsequently machined and polished.

The data on cost of work done to date by the Portland Gas & Coke Co., indicates that it will not exceed 25c per square foot of surface covered with lead. Of this amount approximately 11c per square foot is cost of sandblasting. These figures include all labor and material but are exclusive of overhead costs.

### OFFICERS OF MISSOURI UTILITY GROUP

A. E. Reynolds of the Springfield Gas and Electric Company was elected president of the Missouri Association of Public Utilities for the coming year at the convention held in Jefferson City, April 26th to 28th. Major T. J. Strickler, vice-president and general manager of the Kansas City Gas Company, was elected first vice-president. Other officres elected were Ed. B. Dickey, Hannibal, Mo., second vice-president; D. W. Greenland, St. Louis Public Service Company, third vice-president; and F. D. Beardslee of the Mercantile Trust Company, St. Louis, secretary and treasurer.

### SOUTHWESTERN OPENS DALLAS BRANCH OFFICE

Southwestern Engineering Corporation of Los Angeles, Calif., has established offices in Dallas, Texas, with W. F. Statham in charge. The offices are located in the Magnolia Building.

### 700 AT EMPLOYEE PICNIC

Seven hundred members of the Orange County Efficiency Club of the Southern Counties Gas Company attended that company's annual picnic and banquet, held on May 15 at Balboa Beach, California.

# Natural Gasoline Ass'n *in* Annual Convention

*By* CRAIG ESPY
*Mid-Continent Manager*
*WESTERN GAS*

IN THE minds of many present at Tulsa, the seventh annual convention of the Natural Gasoline Association, May 22, 23, and 24, accomplished more than any previous session held by the organization. Formerly the major emphasis of the convention has been placed on plant operation, but this year such problems as volatility of natural gasoline, gas lift, gas and gasoline analysis, methods in marketing and by-products of natural gasoline were given a prominent place on the program.

When the final count was taken it was found that 574 had registered, this number being larger than that of last year.

F. L. Chase, vice president of the Lone Star Gas Company and a director of the Natural Gasoline Association of America formally opened the convention on the morning of the 22nd with his "welcoming address." In speaking of the growth of the Association since its formation he gave a large share of the credit for this growth and expansion to the spirit of co-operation which has been extant within the organization. "Co-operation," said Mr. Chase, "is the watchword of American business today."

### BRIGHTER OUTLOOK AHEAD

Following this introductory address, the president of the Association, H. A. Trower of the Phillips Petroleum Company, delivered the President's annual address. He pointed to several conditions in the industry which justify his statement that the outlook for the natural gasoline industry for another year is much brighter, mentioning the slight decline in natural gasoline production as pointing toward a better price for motor fuels and natural gasoline. Another healthy condition as outlined is the interest manifested by jobbers in the use of natural gasoline as a blending component in their business, which interest President Trower credited to the research work being conducted by the Association under the direction of Dr. George Granger Brown, Department of Chemical Engineering, University of Michigan, and director of research for the Association. The speaker also pointed out as important the work being done in creating new markets for natural gasoline products.

George P. Bunn of the Phillips Petroleum Company, chairman of the gas testing committee, next outlined the work which his committee had done in connection with standard specific gravity tests.

"The Theory and Practice of Automatic Control" was the subject of a paper read by T. G. Laney of the Fisher Governor Company. The discussion following this paper, led by W. A. Melton of the Shaffer Oil & Refining Company, particularly emphasized the co-operation of the manufacturers of equipment with the man in the industry who brings new ideas to the manufacturer for development.

L. S. Gregory, consulting engineer of Tulsa, had assigned to him the topic, "Theory and Practice of Rectification in Natural Gasoline Plants." Discussion on


**Pipelines are Large Investments--Protect Them!**

Every reliable authority on the subject will tell you that all unprotected pipelines will eventually fail from corrosion!

They will also tell you that a coating that is waterproof, unaffected by soils, age, chemical reaction, electrolytic action and changing temperatures is the best means of protection known to science and experience.

Since PIONEER RUBBERTEX is all of these and, more, it is logical to assume that it pays to use it . . . . on both buried and exposed pipelines!

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RUBBERTEX *and* PIPE COVERING

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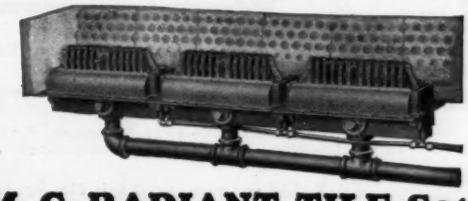
Denver Salt Lake

**R. M. C. Gas Burner**



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# KEY *Special* PIPE JOINT COMPOUND

***Water-Proof***

KEY SPECIAL PIPE JOINT COMPOUND will effectively seal screw thread and gasket joints for such service as Gas, Water, Steam, Compressed Air, etc.

One of the many advantages this compound has over the commonly used red leads and oils, etc., is that the pigment will not settle to the bottom of the container, thereby holding the contents in equal suspension at all times ready for service.

KEY SPECIAL PIPE COMPOUND is not a quick hardening cement but a plastic lubricant and filler that will seal the most obstinate joint with ease.

You may test the high quality of this product by taking a small quantity between the fingers which will immediately demonstrate the wonderful lubricating qualities along with the "pull or drag" that makes possible a permanent seal without resorting to cementing materials, most of which are very undesirable and impracticable to use.

Write for **FREE** Sample

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**1431 Santa Fe Ave.**
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Denver El Paso

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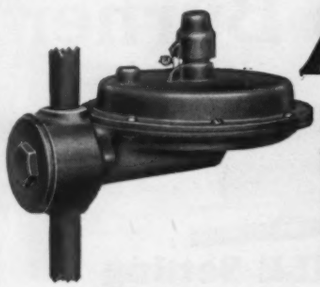
The Hot-N-Kold Shops are now serving the public in eight cities in the northern part of California with Kelvinator Refrigeration, Holbrook Ranges, Welsbauch Water Heaters, and other major appliances.

A valuable business franchise awaits the right dealer in every town.

**HOT-N-KOLD CORPORATION**
949 Mission Street San Francisco, California

MODEL 10 SERIES
With or Without Mercury Seal



Spring Type
Also furnished in Dead Weight Type

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## Gas Control Since 1892

Products for all kinds of Pressure Reduction—for either artificial or natural gas.

GOVERNORS — Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.

VALVE—Automatic Quick Closing Anti Vacuum.

**REYNOLDS GAS REGULATOR COMPANY**
Anderson, Indiana


this paper was led by G. G. Oberfell of the Phillips Petroleum Company.

A humorous paper by S. C. Carney of the Roxana Petroleum Company, prepared under the heading, "Some Considerations Affecting the Butane Supply" brought to the gasoline men the moral: "Do not take your technical problems too seriously" and underneath the humor there was a vein of reasoning that got home to the listeners.

### RESEARCH PROGRAM REPORT

Dr. George Granger Brown, Director of Research for the Association, appeared next on the program, giving his second progress report on the work of his research department and also outlining the anticipated work for next year. His experimentation on volatility and vapor pressures has not only been valuable to the Association but to many others outside this group. His talk occupied the latter part of the afternoon session of the first day and was continued following the dinner hour. During the evening session he showed moving pictures of some of his experimentation work and of the interior of the Laboratory at the University of Michigan. George L. Ratcliffe, General Petroleum Corporation, was chairman of the evening session while E. L. Peck, Empire Gasoline Company was chairman of the afternoon meeting.

G. G. Oberfell, Phillips Petroleum Company, gave one of the outstanding papers of the convention at the Wednesday morning session on the "Volatility of Natural Gasoline." "There are four important aspects of motor fuel volatility," he said. "These are from the viewpoint of vapor locking, starting and acceleration, power and consumption, and crankcase dilution. In addition, antiknock properties are to some extent dependent on volatility. Needless to say these functions are more or less interdependent. In reality, there are but two major aspects of motor fuel volatility. One is the ability of the fuel to reach carburetor jets substantially unvaporized; the other is the vaporization characteristics of the fuels in the manifold and cylinders. Anti-knock properties depend on the nature of the explosion which takes place when the vaporized fuel has been ignited." He attributed to misleading specifications the fact that there is a limited expansion of markets. Discussion on this paper was led by S. C. Carney.

Other subjects treated were, "The Gas Lift and Repressuring, and Their Relation to the Natural Gasoline Industry," by H. B. Bernard, of the Sinclair Oil Company; "Methods of Marketing," by W. T. Anderson, The Oil and Gas Journal; and "The Importance of Gas and Gasoline Analysis to the Natural Gasoline Industry," by W. W. Robinson, Jr., California Gasoline Company. The discussions on these three papers were led respectively by G. M. Davidson, Empire Gasoline Company; D. E. Buchanan, Chestnut & Smith Corporation; and George P. Bunn, Phillips Petroleum Corporation. Emby Kaye, Skelly Oil Company, presided at the Wednesday morning session, and Dr. E. R. Lederer, Texas Pacific Coal & Oil Company, was chairman of the afternoon session.

### OFFICERS AND DIRECTORS

New officers to serve the Association for the year ahead are:

President: H. A. Trower.

Vice-presidents: S. C. Carney, E. R. Lederer, George L. Ratcliffe.

Secretary-Treasurer: A. V. Bourque.

Directors: Phillips Petroleum Co., Armada Petroleum Corp., Skelly Oil Co., Henderson Gasoline Co., Eagle-Picher Lead Co., Carbide & Carbon Chemicals Corp., Calif.

Gasoline Co., Sinclair Oil & Gas Co., Standard Oil Co. of Calif., The Virginian Gasoline & Oil Co., Palmer Corp., Burrell Oil & Gasoline Co.

Numeraus private machine parties, and four busses carrying 100 gasoline men, on the last day of the Convention made a trip to the Greater Seminole field. Gasoline plants of the Sinclair Oil and Gas Company, Indian Territory Illuminating Oil Company, and the Carter Oil Company were visited on the trip.

The annual smoker and entertainment on Monday night was the chief social function of the Convention, and was given the delegates by the Natural Gasoline Supply Men's Association.

Particular mention was accorded at the Tulsa meeting to the California delegation of 16 men who came the longest distance of any delegates present. On the first day the California men were introduced before the Assembly.

## JOHN MARTIN

"A BRILLIANT star that blazed its way across the firmament of the Public Utilities" . . . So the late John A. Britton characterized John Martin —a leader of western gas and electric development and father of the present great corporations that are serving more than half of the cities and towns of the state of California. This brilliant star no longer gleams on the utility horizon, for on May 23, at the age of 69 years, John Martin left the scene of his many accomplishments. Only his name and the records of his achievements live after him, an imperishable monument to one whose courage and determination overcame every obstacle of humble circumstances, and whose vision set him apart as one marked for leadership.

He has been called the father of hydro-electric development in California, and was the organizer of many gas, electric, and telephone companies and railroads throughout the state. Patiently and painstakingly he organized and brought together a host of small utility companies scattered throughout northern California, forming what was later destined to be the Pacific Gas and Electric Company. He founded the Midway Gas Company, organized and built the Casino and Hotel at Santa Cruz, and served as the first president of the Coast Counties Gas and Electric Company.

Of late years Mr. Martin has been chairman of the board of the Midcontinent Utilities Corporation, a position which he held at the time of his death. He is survived by a daughter and four sons. His funeral was held in Oakland on Friday, May 25th.

## OKLAHOMA NATURAL GAS TOWNS ON CONSTANT INCREASE

Another Oklahoma town was recently added to the long list of municipalities having natural gas service. Earl W. Baker Utilities Company established gas distribution service at Lovell, in the Logan County oil fields of Oklahoma on May 1.

Cherokee, Okla., on April 30, was added to the list of Oklahoma, Kansas and Texas towns, which have recently voted natural gas franchises to the Winchester Oil and Gas Company.

Apache recently granted a gas franchise to the Centralwest Gas Company of Oklahoma City. Among towns which are soon to vote on natural gas franchises are: Asher, to M. W. Hampton of Asher; Snyder and Mountain Park, to a syndicate at McLean, Texas; Grandfield, to C. O. Moore of Stamford, Texas; and Thomas to the Centralwest Gas Company.


# Don't be "talked out" of "the world's greatest tire"

**SOME dealers may try to sell you something else . . . offer you alluring inducements to get you to buy some other tire.**

**But don't be "talked out" of the New Goodyear Balloon Tire unless you are offered some adequate offset for Goodyear's specific advantages. Ask yourself:**

**Has this other balloon tire tested and proved anti-skid protection in the tread center where it belongs?**

**Does it embody patented SUPERTWIST, the elastic material which has reduced casing failure in Goodyear Tires almost to the vanishing point?**

**Does it combine road safety and long tread wear with smooth and quiet running?**

**Is it armored with the famous All-Weather Tread of special tough rubber . . . the greatest non-skid tread that has ever been developed?**

**Does it have a local service organization back of it possessing the years of experience, modern equipment and scientific knowledge similar to that of Truck Tire Service, to assure you lasting satisfaction until its last mile is run?**

**These are the things you surrender when you let yourself be "talked out" of the New Goodyear Balloon Tire. They are the reasons why this new Goodyear has earned the title of "The World's Greatest Tire."**

***Remember, too: "There are No Miles in a Bottle of Ink"***

*"A Tire for Every Need"*

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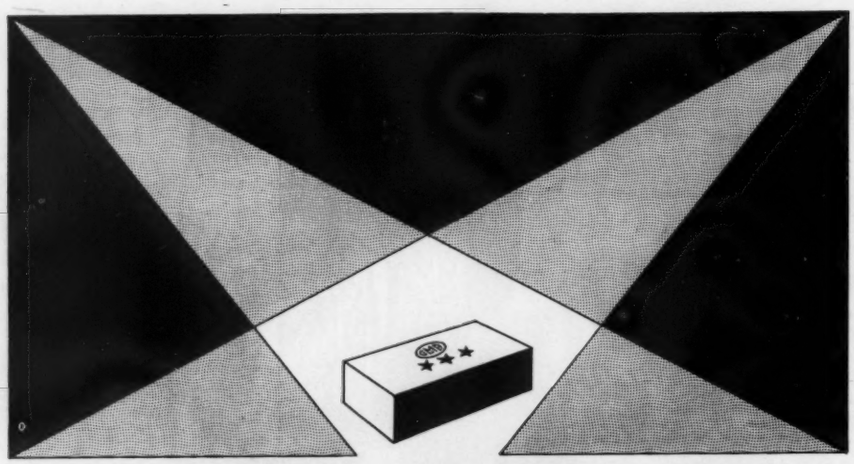

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LININGS, CHECKERS and BOILER SETTINGS are carried in stock for quick shipment. If special or hand-made shapes are required, our plant is especially equipped to make them.

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FERROX

Purifier

*meets these essential requirements of a good Gas Purifier*

A highly active Iron precipitate, with a high Iron content. A thoroughly impregnated and porous bulky mass, ready to use, no delay, always uniform.

*A dependable source of supply*

Pioneer manufacturers of Industrial Chemicals on the Pacific Coast

Stauffer Chemical Company

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## DETAILS GIVEN ON MONTANA-DAKOTA PROJECT

It was announced in May that the line to be laid by the Hope Engineering & Supply Company for the Montana-Dakota Power Compay from Little Beaver dome in Montana to White Wood, Sotuh Dakota, and from there to Rapid City will be a 12-inch pipe from Little Beaver to Whitewood, 8-inch pipe from White Wood to Deadwood, and 10-inch from Deadwood to Rapid City. Plain-end pipe with Dresser couplings will be used.

Completion of the project is planned so as to bring gas before the advent of winter to the towns which will be served. These include Belle Fourche, Whitewood, Sturgis, Spearfish, Deadwood, Lead, Telford, Piedmont, Black Hawk, Rapid City and St. Onge.

## SAMUEL S. SPROAT DIES AT DALLAS, MAY 9

Samuel S. Sproat, president of the Ward Heater Company of Los Angeles, died suddenly in Dallas, Texas, May 9, at the age of 58, passing away in his sleep, presumably from a heart attack. He had gone to Dallas to attend the American Gas Association convention and to officiate at the formal opening of the newest sales branch of his company in the Texas city.

Samuel S. Sproat was born in Topeka, Kansas, August 17, 1869. He engaged in the refrigerator business in New York City before the World War, and upon his retirement came to Southern California to make his home. He became interested in the Ward Heater Company in 1918.

## A. B. WICKS IN ILLINOIS ON INSPECTION TRIP

A. B. Wicks, heating and ventilating engineer for the City of Los Angeles, is at present in Cleveland, Ohio, inspecting the American Gas Association's Testing Laboratory, as a guest of the Gas Furnace Association of California. Mr. Wicks will also go to Urbana, Illinois, to inspect the proving plant of the National Warm Air Heating and Ventilating Association, and to confer with Professor A. C. Willard, head of the applied mechanical arts department of the University of Illinois. Another call on Mr. Wicks' itinerary will be the building department of the City of Chicago, where he will look into operation of the furnace ordinance there in force.

## NILES LINE UNDER WAY

The Pacific Gas and Electric Company gas construction crews are now extending a 6-inch feeder main to Niles, Calif.

There are 50 odd men on the job who work progressing at the rate of about 800 feet per day. Work on the distribution system at Niles will be started about June 10, gas to be available for local consumers prior to July 1. From Niles the mains will be extended along the Niles-Centerville Road to Centerville and over the proposed route to serve Newark and Alvarado.

## ENTERTAIN RESTAURANT MEN

The Kansas City Gas Company entertained more than 175 members of the Restaurant Men's Association of Kansas City at a steak dinner given on the fourth floor of the company's building at the regular monthly meeting of the Association held the 26th of April.

## ROPER BROADSIDE

The George D. Roper Company of Rockford, Illinois, has just issued a direct-by-mail broadside featuring Roper Sheetflame Radiant Heaters, and prepared for distribution to gas companies and dealers.

### T. H. WEYMOUTH NEW HEAD OF OKLAHOMA NATURAL GAS

Thomas R. Weymouth, president of the Iroquois Gas Corporation, of Buffalo, New York, has been appointed general manager of the Oklahoma Natural Gas Corporation of Tulsa, following the resignation of R. C. Sharp who has been associated with the company since 1917, first in an executive capacity, then as vice-president, later as president and general manager and most recently as chairman of the board.

Mr. Weymouth is a director and member of the board of management of the Natural Gas Department of the A. G. A.

### BIRMINGHAM ADVERTISING FIRM INCORPORATES

Oliver Cox and Ralph Silver on May 1 took over the business of the Cox Advertising Agency of Birmingham, Alabama, under the name of Cox and Silver, Incorporated. Mr. Cox has operated this agency for the last 10 years as the Cox Adventising Agency, Mr. Silver, for the past 12 years advertising manager of the American Cast Iron Pipe Company of Birmingham, having joined the concern last December at which time the present incorporation was contemplated. The firm will act as general advertising and sales promotion counsellors, giving its special attention to industrial accounts.

### INSTALL ELECTRIC PRECIPITATOR AT PORTLAND PLANT

Construction work on the installation of an electric precipitator for cleaning the stack gases from the lampblack dryers of the Portland Gas & Coke Company, is progressing. The foundations have been installed and the forms for the concrete housings and flues for connecting to the dryers are now being erected. It is expected to complete the concrete work by the middle of May and start installation of the electric machinery so that the precipitator will be in operation about July 15th.

This treater is to cost approximately $90,000 and have a capacity of handling 70,000 cubic feet of stack gases per minute.

### SPRAGUE METER CO. ANNOUNCES NEW PRODUCT

Sprague Meter Company announces a new product which the manufacturer has designated as the Big Six Sprague Positive Meter, which passes 15,000,000 cubic feet of gas per revolution. The meter is of the poppet valve type, and dimensions are: height over all 50 inches, length 49 inches, depth 29 inches; distance from face to face of flange 47¾ inches; weight 1150 pounds. Six-inch standard flange connections are used The index reads to 100,000,000 cubic feet.

### ALBUQUERQUE COOKING SCHOOL

On May 21 the Albuquerque, N. M., Journal opened a four-day cooking school, conducted at the Women's Club under the direction of Mrs. Ida M. Chitwood. The Albuquerque Gas & Electric Company cooperated, loaning an all-enamel gas range for use in the demonstration.

### PRESIDENT'S ROUND TABLE IS INAUGURATED BY L. A. G. AND E.

Forty-five heads and assistant heads of departments of the Los Angeles Gas and Electric Corporation met in the company cafeteria on May 1st at the invitation of president and general manager Addison B. Day for the first monthly meeting of a new organization, known as the President's Round Table. "Training of Employees in the Duties of Their Position" was the subject of the first evening meeting.


Billions of Bubbles

Pat Couldn't Wait for the Train

The Irishman who decided he didn't have time to wait for the train soon discovered his error of judgment. Many Operators of Natural gasoline absorption plants are trying to get along with obsolete equipment and slow methods that give no assurance of completely absorbing the gasoline while other Operators have taken the time to install the most approved system—Campbell Oil-Froth Absorbers.

Three times as much gasoline in California is produced by Campbell Absorbers than by all other Absorbers combined—forceful testimony of the phenomenal success attained on the Coast.

Ask for Catalog

J. A. Campbell
Natural Gasoline Engineer
Consulting—Designing—Constructing
P. O. Box 669 LONG BEACH, CALIF.

CAMEL-DRY GAS

Campbell Oil-Froth Absorbers


### RIX COMPANY BULLETIN ON AIR COMPRESSORS

Bulletin No. 150-D, just issued by The Rix Company, Inc., San Francisco, describes a new line of Diesel and high-pressure auxiliary air compressors. The units specified as DE, DF, and DF-2 are self-contained gasoline engine driven, and are suitable for operating pressures from 250 pounds to 1500 pounds per square inch.

Specifications and descriptions of standard high-pressure compressors for use with solid injection Diesel engines and other high-pressure air work are incorporated in the bulletin.

### JAMES B. McCABE NOW HEADS MUNICIPAL GAS COMPANY

James B. McCabe of Dallas, Texas, former vice-president and general manager, has been elected to the presidency of the Municipal Gas Company. The announcement follows a recent meeting of the directors held in the Dallas offices.

### W. P. McCOY TO REPRESENT CLEVELAND GAS BURNER

W. P. McCoy, for the past eight years sales manager for Abendroth Bros. of Port Chester, New York, has just been appointed sales manager for the Cleveland Gas Burner & Appliance Company of Cleveland, Ohio.

### AMERICAN GAS PRODUCTS CORP. ADV. MANAGER RESIGNS

Brewster S. Beach, sales and advertising manager of the American Gas Products Corporation, New York, distributor of Ideal Gas Boilers, has recently resigned his position with that company.

### CAMPBELL GOES WITH ECLIPSE FUEL ENGINEERING CO.

Don A. Campbell, for the past three and one-half years head of the industrial department, Kansas City Gas Company, is now with the Eclipse Fuel Engineering Company at Rockford, Illinois.

# A WESTERN GUIDE to INDUSTRIAL PURCHASING

Readers interested in any articles not listed in these pages are cordially invited to advise *Western Gas* of their wants and every effort will be made to furnish a list of the proper manufacturers. Addresses of companies listed on these pages may be found by consulting their advertisements in this issue.

**Absorption and Compression Plant Equipment**
Baker Iron Works.
J. A. Campbell.
Chaplin-Fulton Mfg. Co.
Fluor Construction Co.
Jackson Engr. & Equip. Co.
Jensen Instrument Co.
The E. A. Key Company
Western Pipe & Steel Co.

**Absorption Towers**
Baker Iron Works.
J. A. Campbell.
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

**Adjustable Plugs**
Lattimer-Stevens Co.
Western Pipe & Steel Co.

**Agitators**
Baker Iron Works.
The Bartlett Hayward Co.
Western Pipe & Steel Co.

**Aluminum Bronze Powder for Paint**
W. P. Fuller & Co.
Hill, Hubbell & Co.

**Analyzers**
Fort Worth Laboratories.
A. R. Maas, Laboratories.
Smith-Emery Co.

**Annealers (Bar, Blank, Strip)**
Pacific Meter Works.

**Anti-Fluctuators**
Pacific Meter Works.

**Apparatus, Experimental Gas**
The Bartlett Hayward Co.
Pacific Meter Works.

**Appraisals and Valuations**
Charles R. Collins.
Smith-Emery Co.

**Automobile Tires**
Truck Tire Service Co.

**Bags, Gas Main**
C. B. Babcock Co.
Mueller Co.
Safety Gas Main Stopper Co.
Semet-Solvey Engr. Corpn.

**Barometers**
Fort Worth Laboratories.
Jensen Instrument Co.
Westcott & Greis, Inc.

**Bench Iron Work**
The Bartlett Hayward Co.
General Gas Light Co.

**Blast Gates**
Semet-Solvay Engr. Corpn.

**Blocks and Tiles, Fire Clay**
Gladding, McBean & Co.
Semet-Solvay Engr. Corpn.
Stockton Fire Brick Co.

**Blowers and Boosters**
Ingersoll-Rand Co.
Connersville Blower Co.

**Boiler Controls**
Gilfillan Machine Works, Inc.

**Boiler—Brickwork**
J. T. Thorpe & Son, Inc.

**Boiler Equipment**
E. A. Key Co.

**Boiler Maker's Tools**
E. A. Key Co.

**Boilers, Gas-Fired**
C. B. Babcock Co.
Baker Iron Works.

**Boiler Settings, Pipe and Boiler Insulation**
Pioneer Paper Company.
J. T. Thorpe & Son, Inc.

**Boilers, Waste Heat**
Baker Iron Works.
The Bartlett Hayward Co.

**Boilers, Water Tube**
Baker Iron Works.
Western Pipe & Steel Co.

**Boxes**
Baker Iron Works.
Semet-Solvay Engr. Corpn.

**Brass (rods, sheets, tubes, wire)**
Mueller Co.

**Breakers**
Ingersoll-Rand Co.

**Breeching (Boiler and Stack)**
The Bartlett Hayward Co.
Western Pipe & Steel Co.

**Brick, Firebrick**
Gladding, McBean & Co.
Semet-Solvay Engr. Corpn.
Stockton Fire Brick Co.

**Brick, Firebrick—Installation**
J. T. Thorpe & Son, Inc.

**Brushes, Wire Pneumatic**
Ingersoll-Rand Co.

**Buildings, Steel**
Baker Iron Works.
Western Pipe & Steel Co.

**Bunkers, Steel and Concrete**
The Bartlett Hayward Co.
Western Pipe & Steel Co.

**Burners, High Pressure**
Lee B. Mettler.
Rotary Manufacturing Co.

**Burners, Low Pressure**
C. B. Babcock Co.
The Bartlett Hayward Co.
General Gas Light Co.
Johnson Gas Appliance Co.
Lee B. Mettler.
Payne Furnace & Supply Co.
Rotary Manufacturing Co.
Standard Gas Equipment Corp.

**Burners—Oil**
Rotary Manufacturing Co.

**By-product Recovery Apparatus**
The Bartlett Hayward Co.
Oliver Continuous Filter Co.
Semet-Solvay Engr. Corpn.

**Calorimeter Accessories**
Fort Worth Laboratories.
Pacific Meter Works.

**Calorimeters**
Pacific Meter Works.

**Cases, Meter**
Pacific Meter Works.
Pittsburgh Equitable Meter Co

**Casinghead, Gas Meters**
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.

**Casing and Tubing (steel)**
Semet-Solvay Engr. Corpn.
South Chester Tube Co.

**Casing—Iron**
South Chester Tube Company

**Cast Iron Pipe**
McWane Cast Iron Pipe Co.
Semet-Solvey Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

**Castings**
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

**Cement**
Stockton Fire Brick Co.

**Cement, High Temperature**
Stockton Fire Brick Co.

**Cement—Plastic**
Pioneer Paper Company.

**Centrifugal Pipe**
United States Cast Iron Pipe and Foundry Co.

**Charging Machines (retort, etc.)**
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

**Checker Brick**
Gladding, McBean & Co.
Semet-Solvay Engr. Corpn.
Stockton Fire Brick Co.

**Chemical and Gas Testing Apparatus**
Fort Worth Laboratories.
Pacific Meter Works.
Stauffer Chemical Co.
Westcott & Greis, Inc.

**Chemists, Analytical**
Fort Worth Laboratories.
A. R. Maas, Laboratories.
Smith-Emery Co.

**Chimneys, Radial Brick**
Gladding, McBean & Co.
Stockton Fire Brick Co.

**Chimneys, Radial Brick Installation**
J. T. Thorpe & Son, Inc.

**Chutes (coal, coke, ash)**
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

**Clamps and Sleeves, Pipe**
S. R. Dresser Mfg. Co.
Mueller Co.

**Clamps, Service**
Mueller Co.

**Cleaners, Service**
C. B. Babcock Co.
Pacific Meter Works.

**Coal Gas Plants**
Charles R. Collins.
Semet-Solvay Engr. Corpn.
The Bartlett Hayward Co.

**Coal Tar Products and Chemicals**
W. P. Fuller & Co.
A. R. Maas, Laboratories.

**Cocks**
C. B. Babcock Co.
Johnson Gas Appliance Co.
Lattimer-Stevens Co.
Merco Nordstrom Valve Co.
Mueller Co.
Geo. D. Roper Corporation.

**Collectors, Dust**
Western Pipe & Steel Co.
Semet-Solvay Engr. Corpn.

**Compressors, Air**
The C. & G. Cooper Co.
Ingersoll-Rand Co.
Oliver Continuous Filter Co.

**Compressors, Gas**
The C. & G. Cooper Co.
Ingersoll-Rand Co.

**Compressors, High Pressure**
The C. & G. Cooper Co.
Ingersoll-Rand Co.

**Compressors, Portable**
Ingersoll-Rand Co.

**Condensers**
Baker Iron Works.
The Bartlett Hayward Co.
Ingersoll-Rand Co.
Semet-Solvay Engr. Corpn.

**Condenser Boxes**
Baker Iron Works.

**Condenser Tubes**
Semet-Solvay Engr. Corpn.

**Controllers**
Fort Worth Laboratories.
Jensen Instrument Co.
The Foxboro Co., Inc.
Robertshaw Thermostat Co.

**Controls, Air and Steam**
Jensen Instrument Co.
The Bartlett Hayward Co.
C. F. Braun & Co.
The Foxboro Co., Inc.

**Cooling Systems**
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

**Cooling Towers**
J. A. Campbell
Fluor Construction Co.
J. B. Gill Corporation.
Jackson Engr. & Equip. Co.
Semet-Solvay Engr. Corpn.

**Counters, Revolution**
Fort Worth Laboratories.
Jensen Instrument Co.

**Couplings**
S. R. Dresser Mfg. Co.
The Bartlett Hayward Co.

**Coverings (Tank, Boiler, Cold and Steam Pipe)**
Pioneer Paper Company.

**Cubic Foot Bottle**
Pacific Meter Works.

**Cutters, Pavement**
Ingersoll-Rand Co.

**Cutters, Pavement**
Ingersoll-Rand Co.

**Cylinders, Compressor**
The C. & G. Cooper Co.
Semet-Solvay Engr. Corpn.

**Dephlegmaters**
J. A. Campbell
Semet-Solvey Engr. Corpn.
Western Pipe & Steel Co.

**Diaphragms, Meter**
Chaplin-Fulton Mfg. Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co

**Diggers, Clay**
Ingersoll-Rand Co.

**Discharging Machines (retort, etc.)**
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

**Displacement System, Tar**
Semet-Solvey Engr. Corpn.

**Door, Clean-out**
Baker Iron Works.
Semet-Solvay Engr. Corpn.

**Drills**
Ingersoll-Rand Co.
Mueller Co.

**Drill Pipe—Iron**
South Chester Tube Company

**Drill Pipe—Steel**
South Chester Tube Company

**Dryers—Domestic Laundry, Commercial Laundry. Laboratory, Industrial.**
The W. E. Lamneck Co.

**Dryers—Blue Prints, Photograph film, etc.**
The W. E. Lamneck Co.

**Dryers—Dehydrating Fruits,**
The W. E. Lamneck Co.

**Elevators**
Baker Iron Works.

**Engineers and Engineering Service**
J. A. Campbell
Charles R. Collins.
J. B. Gill Corporation.
The Bartlett Hayward Co.
A. R. Maas, Laboratories.
Smith-Emery Co.
Southwestern Engineering Corp.
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

**Engines, Diesel**
The C. & G. Cooper Co.

**Engines, Gas**
The C. & G. Cooper Co.
Ingersoll-Rand Co.

**Engines, Oil**
The C. & G. Cooper Co.
Ingersoll-Rand Co.

**Engines, Steam**
Ingersoll-Rand Co.

**Evaporating Apparatus**
The Bartlett Hayward Co.
C. F. Braun & Co.
United States Cast Iron Pipe and Foundry Co.
Southwestern Engineering Corp.

**Excavators, Ditch and Trench**
The Cleveland Trencher Co.

**Exchangers, Heat**
Baker Iron Works.
C. F. Braun & Co.
J. A. Campbell
Southwestern Engineering Corp.
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

**Exhausters**
Connersville Blower Co.
Ingersoll-Rand Co.
United States Cast Iron Pipe and Foundry Co.

**Experimental Apparatus**
The Bartlett Hayward Co.
Pacific Meter Works.

**Extractors**
The Bartlett Hayward Co.
Semet-Solvay Engr. Corpn.

**Faucets, Drain**
Mueller Co.

**Felt—Deadening**
Pioneer Paper Company.

**Filters**
Oliver Continuous Filter Co.
United States Cast Iron Pipe and Foundry Co.

**Fire Clay and Products**
Gladding, McBean & Co.
Stockton Fire Brick Co.

**Fire Brick Contractors**
J. T. Thorpe & Son, Inc.
Stockton Fire Brick Co.

**Fittings**
The Bartlett Hayward Co.
McWane Cast Iron Pipe Co.
Semet-Solvay Engr. Corpn.
United States Cast Iron Pipe and Foundry Co.

**Fixtures, Lighting (Domes, Portables, etc.)**
C. B. Babcock Co.
Welsbach Company.

**Feed Water Heaters**
C. F. Braun & Co.
Southwestern Engineering Corp.

**Fire Brick**
Gladding, McBean & Co.
Stockton Fire Brick Co.
Semet-Solvay Engr. Corpn.

**Flanges**
Pittsburgh Equitable Meter Co
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

**Flooring—Industrial**
Pioneer Paper Company.

**Forgings**
Baker Iron Works.
Payne Furnace & Supply Co.
Pacific Gas Heating Co.
Geo. D. Roper Corporation.
J. T. Thorpe & Son, Inc.

**Furnaces, Floor**
Electrogas Furnace Co.
Magic Way Company
Payne Furnace & Supply Co.
Pacific Gas Heating Co.
Ward Heating Co.

**Furnaces, Heating**
Payne Furnace & Supply Co.
Pacific Gas Heating Co.
Magic Way Company.

**Furnaces, Lead Melting**
C. B. Babcock Co.
The Estate Stove Co.
Johnson Gas Appliance Co.
Mueller Co.
Payne Furnace & Supply Co.

**Gas Analysis Apparatus**
The Foxboro Co., Inc.
Fort Worth Laboratories.
Jensen Instrument Co.
Pacific Meter Works.

**Gas Masks**
Safety Gas Main Stopper Co.

**Gas Main Tapping & Drilling Machines**
Mueller Co.

**Gaskets**
The E. A. Key Company
Pittsburgh Equitable Meter Co
Safety Gas Main Stopper Co.
Semet-Solvay Engr. Corpn.
Southwestern Pipe Joint and Engineering Co.

**Gasket Compound**
W. P. Fuller & Co.
E. A. Key Co.

**Gasometer**
Pacific Meter Works.

**Gas Pipe Line Construction**
Western Pipe & Steel Co.

**Gauges**
Fort Worth Laboratories.
The Foxboro Co., Inc.
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Westcott & Greis, Inc.

**Gauges, Steam**
Jensen Instrument Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

**Gauges, U Type**
C. B. Babcock Co.
Fort Worth Laboratories.
Jensen Instrument Co.

### H. L. MASSER ON BUILDERS' EXCHANGE DIRECTORATE

Harry L. Masser, vice-president and executive engineer of the Los Angeles Gas and Electric Corporation, on May 8 was appointed to the executive committee and the directorate of the Los Angeles Builders' Exchange by Ralph E. Homann, president of the Exchange.

Under the direction of its executive committee the Los Angeles Builders' Exchange is rewriting the Los Angeles building ordinance, co-operating with the Los Angeles Building Department.

### NORTH KANSAS CITY VOTES GAS SERVICE FRANCHISE

A 20-year gas franchise was granted by the voters of North Kansas City on May 8th to the Gas Service Company. Under the franchise the Kansas City Gas Company will lay the mains and provide the gas service. The laying of a 16-inch high pressure main across the Armour-Swift-Burlington bridge into North Kansas City will be begun immediately. Gas will be turned on early in September.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.,
Required by the Act of Congress of August 24, 1912, of *Western Gas*, published monthly at Los Angeles, California, for April 1st, 1928.
State of California,
County of Los Angeles—ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Jay Jenkins, who, having been duly sworn according to law, deposes and says that he is the publisher of *Western Gas*, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher—Jay Jenkins, Los Angeles, Calif.
Managing Editor—George H. Finley, Los Angeles, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)
Western Business Papers, Inc.
Jay Jenkins, 1224 Redondo Blvd., Los Angeles, Calif.
James E. Jenkins, 612 St. Paul Ave., Los Angeles, Calif.
George H. Finley, 739½ N. Alexandria, Los Angeles, Calif.
H. Elliott Taylor, 447 Sutter St., San Francisco, Calif.

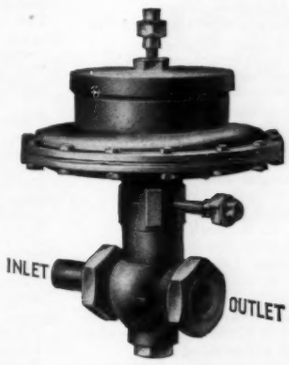
3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

JAY JENKINS, Publisher.

Sworn to and subscribed before me this 21st day of March, 1928.
(SEAL) GLADYS L. KRAFFT.
(My commission expires June 23rd, 1929.)


# Fulton Dead Weight Governor

An unusually sensitive, frictionless and long-lasting governor to be used either as a direct governor, or for individual service. Maintains a uniform pressure throughout the entire range of flow.

WRITE for the Chaplin-Fulton 60-page catalog It's free and contains data on our many time-tested and proven gas regulators that you will find invaluable in your work.

## The Chaplin-Fulton Mfg. Co.

**Organized 1884—Oldest Builders of Gas Regulators in the Country. Built in all Sizes, From 1 Inch to 24 Inches; For All Service. 1 oz. up to 1,600 lbs. Pressure to Square Inch.**

**28-36 Penn Avenue** **Pittsburgh, Pa.**

**REPRESENTATIVES:**

**WESTCOTT & GREIS, Inc.**
**Sales and Service**
**Dallas—Los Angeles—Tulsa**

**JNO. W. CRAWFORD**
**Sales Engineer**
**1855 Industrial St. Los Angeles**

# *Fire Brick Contractors*

**Established 1906**

## J. T. Thorpe & Son

***Inc.***

**Specializing in Gas Generator, Boiler, Still and Furnace Brick, Industrial Furnaces, Retorts, Kilns, Brick Smokestacks.**

*A capable Engineering Department competent to advise on any problem involving firebrick construction.*

**San Francisco** 417 Market St.
**Seattle** 939 Stewart Bldg.
**Portland** 609 Ry. Exch. Bldg.
**Los Angeles** 321 W. 3d St.

Lee B. Mettler.
Pacific Meter Works.
Safety Gas Main Stopper Co.
Semet-Solvay Engr. Corpn.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

**Generators, Water Gas**
The Bartlett Hayward Co.
Baker Iron Works.
Semet-Solvay Engr. Corpn.

**Glassware**
Fort Worth Laboratories.
Westcott & Gries, Inc.

**Governors**
C. B. Babcock Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Pacific Meter Works.
Reynolds Gas Regulator Co.
Sprague Meter Co.
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

**Hammers**
Ingersoll-Rand Co.

**Hanger, Meter**
Mueller Co.

**Hangers, Iron and Steel**
Baker Iron Works.

**Heaters**
C. B. Babcock Co.
Baker Iron Works.
C. F. Braun & Co.
The Estate Stove Co.
General Gas Light Co.
Magic Way Company.
New Way Mfg. Co.
Pacific Gas Heating Co.
Payne Furnace & Supply Co.
Welsbach Company.

**Heaters, Floor**
General Gas Light Co.
Magic Way Company.
Payne Furnace & Supply Co.

**Heaters, Wall**
C. B. Babcock Co.
General Gas Light Co.
Magic Way Company.
Payne Furnace & Supply Co.

**Heat Exchangers**
Baker Iron Works.
C. F. Braun & Co.
Southwestern Engineering Corp.
Semet-Solvey Engr. Corpn.
Western Pipe & Steel Co.

**Heat Interchangers**
C. F. Braun & Co.
Southwestern Engineering Corp.
J. A. Campbell
Semet-Solvay Engr. Corpn.
Western Pipe & Steel Co.

**Hoists**
Ingersoll-Rand Co.

**Holders**
The Bartlett Hayward Co.
Baker Iron Works.

**Holders, High Pressure**
Baker Iron Works.
Western Pipe & Steel Co.

**Hoppers**
The Bartlett Hayward Co.

**Hose, Air**
Ingersoll-Rand Co.

**Hot Plates**
C. B. Babcock Co.
Johnson Gas Appliance Co.
Geo. D. Roper Corporation.

**Hygrometers**
Fort Worth Laboratories.
Jensen Instrument Co.
The Foxboro Co., Inc.
Westcott & Greis, Inc.

**Incinerators**
C. B. Babcock Co.
Baker Iron Works.
J. T. Thorpe & Son, Inc.
Western Pipe & Steel Co.

**Incinerator Brickwork**
J. T. Thorpe & Son, Inc.

**Indicators**
Westcott & Greis, Inc.

**Instruments (Measuring, Testing and Recording)**
Fort Worth Laboratories.
Jensen Instrument Co.
Pacific Meter Works.
The Foxboro Co., Inc.
Semet-Solvay Engr. Corpn.
Westcott & Greis, Inc.

**Insulating Materials**
W. P. Fuller & Co.
Pioneer Paper Company.
Stockton Fire Brick Co.

**Joint Runners Asbestos**
Safety Gas Main Stopper Co.

**Kilns**
J. T. Thorpe & Son, Inc.
Western Pipe & Steel Co.

**Kilns—Brickwork**
The Bartlett Hayward Co.

**Laboratory Supplies**
Fort Worth Laboratories.
Mueller Co.
Westcott & Greis, Inc.

**Ladles, Hot Metal**
Mueller Co.

**Lamps**
C. B. Babcock Co.
General Gas Light Co.
Welsbach Company.

**Lighters**
C. B. Babcock Co.
Tappan Stove Co.

**Lighting Incidentals**
C. B. Babcock Co.
Welsbach Company.

**Line Pipe—Iron**
South Chester Tube Company

**Line Pipe—Steel**
Amer. Seamless Tube Corp.
South Chester Tube Company

**Linings—Brickwork**
J. T. Thorpe & Son, Inc.

**Linings—Car**
Pioneer Paper Company.

**Main, Bags**
C. B. Babcock Co.
Mueller Co.
Safety Gas Main Stopper Co.

**Mains, Street**
United States Cast Iron Pipe and Foundry Co.

**Main, Stopper**
C. B. Babcock Co.
Mueller Co.
Safety Gas Main Stopper Co.

**Mantles, Gas Lighting**
C. B. Babcock Co.
General Gas Light Co.
Welsbach Company.

**Manometers**
J. A. Campbell
Fort Worth Laboratories.
Jensen Instrument Co.
Lee B. Mettler.
Westcott & Greis, Inc.

**Meters, Air**
Connersville Blower Co.
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Westcott & Greis, Inc.

**Meters, Boiler**
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.

**Meters, Burner Test**
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

**Meters, Cast Iron Gas**
The Bartlett Hayward Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.

**Meter Connections**
Lattimer-Stevens Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
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Pittsburgh Equitable Meter Co
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Pittsburgh Equitable Meter Co
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The Foxboro Co., Inc.

**Meters, Iron Case**
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Pittsburgh Equitable Meter Co
Sprague Meter Co.

**Meters, Laboratory**
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Pittsburgh Equitable Meter Co
Sprague Meter Co.
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Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
Sprague Meter Co.
Westcott & Greis, Inc.

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Jensen Instrument Co.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Westcott & Greis, Inc.

**Meters, Orifice**
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Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.
Robinson Orifice Fitting Co.
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Pittsburgh Equitable Meter Co
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*Note*: *Western Gas* will publish free of charge, under this heading, advertisements of situations wanted. Maximum length, 50 words; additional space at classified rates five cents per word per insertion. Copy should be neatly typewritten on one side of paper only, and should be mailed to reach *Western Gas* not later than the 20th day of the month prior to publication date.

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### MOVES L. A. OFFICES

To provide larger and more efficient quarters the Los Angeles sales offices of Hill, Hubbell & Company, Pacific Coast paint manufacturers will be moved on June 1st, from 331 West 11th Street, to the Petroleum Securities Building, 714 West 10th St.

### APPOINTS REPRESENTATIVES

The Jensen Instrument Company, located at 443 San Pedro Street, Los Angeles, Calif., has been appointed special California and Arizona representatives of the Gilfillan line of pressure regulating and controlling devices, manufactured by the Gilfillan Machine Works, Inc., Ebenezer, New York.

Gilfillan has also recently appointed a Texas representative, the Gas Appliance Service Corp., 2104 Bryan St., Dallas, which has A. P. Stephens as president.

Glen G. Langan, vice-president of the Hill-Hubbell Company, San Francisco, manufacturers of protective paints, died last month in Colorado Springs from heart disease. He was in charge of the Mid-Continent field for the company, with headquarters at Tulsa where the company maintains a factory.


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including

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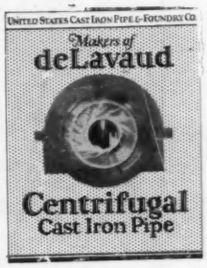


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*to the West*

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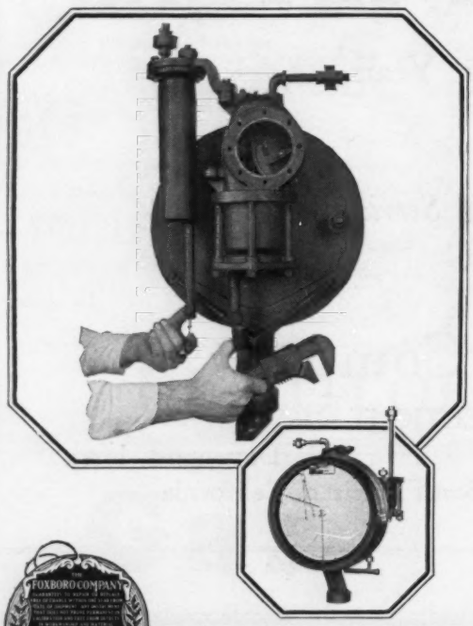

**The man in the field will be quick to appreciate how simple a job it is to clean the new Foxboro Orifice Meters. After cleaning and assembling, the meter is zeroed by a simple micrometer adjustment.**

The many revolutionary advantages of the new Foxboro Orifice Meter has led to its adoption by oil and gas companies everywhere. It has no inherent error. It has a uniform scale chart. Office corrections for variables are reduced to a minimum. The records by which you buy or sell gas will be accurate, not approximate. It is the most powerful float type meter on the market. All parts are practically indestructible. Calibration is permanent.

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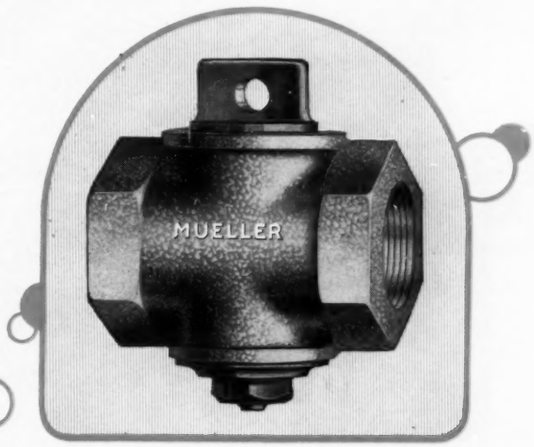
*THE COMPASS OF INDUSTRY*


## Advertisers' Index


*American Gas Products Co.* ..... 15
*The Arco Company* ..... 48
*C. B. Babcock Co.* ..... 55
*The Bartlett Hayward Co.* ..... 63
*J. A. Campbell* ..... 57
*Chaplin-Fulton Mfg. Co.* ..... 59
*Cleveland Trencher Co.* ..... 50
*Connersville Blower Co.* ..... 5
*C. & G. Cooper Co.* ..... 1
*S. R. Dresser Mfg. Co.* ..... 3
*Electrogas Furnace Co.* ..... 49
*The Estate Stove Co.* ..... —
*Everlasting Paint & Sales Co.* ..... —
*The Foxboro Co., Inc.* ..... 64
*General Gas Light Co.* ..... 18
*Gilfillan Machine Works, Inc.* ..... 11
*Gladding, McBean & Co.* ..... 56
*Hill, Hubbell & Co.* ..... 6
*The Hot-N-Kold Corporation* ..... 54
*Imperial Gas Co.* ..... 52
*Ingersoll-Rand Co.* ..... 47
*Johnson Gas Appliance Co.* ..... 52
*E. A. Key Company* ..... 54
*The W. E. Lamneck Co.* ..... —
*Lattimer-Stevens Co.* ..... *Fourth Cover*
*Magic Way Company* ..... 61
*McWane Cast Iron Pipe Co.* ..... 10
*Merco Nordstrom Valve Co.* ..... *Second Cover*
*Lee B. Mettler Co.* ..... 2
*Chas. C. Moore & Co.* ..... 61
*Morey, Jones & Lovell* ..... 50
*Mueller Co.* ..... *Third Cover*
*Pacific Gas and Electric Co.* ..... 8
*Pacific Meter Works* ..... 12
*Payne Furnace & Supply Co., Inc.* ..... 51
*Pioneer Equipment Corp.* ..... 49
*Pioneer Paper Co.* ..... 53
*Pittsburgh Equitable Meter Co.* ..... 7
*Reliance Manufacturing Co.* ..... 47
*Reynolds Gas Regulator Co.* ..... 54
*Robertshaw Thermostat Co.* ..... 45
*Robinson Orifice Fitting Co.* ..... 44
*George D. Roper Corporation* ..... 14
*Rotary Manufacturing Co.* ..... 53
*Safety Gas Main Stopper Co.* ..... 4
*South Chester Tube Co.* ..... 52
*Southwestern Pipe Joint & Engr. Co.* ..... 10
*Sprague Meter Company* ..... 63
*Stauffer Chemical Co.* ..... 56
*Stockton Fire Brick Co.* ..... 50
*Superbo Mfg. Co.* ..... 45
*Tappan Stove Company* ..... 16
*J. T. Thorpe & Son* ..... 59
*Truck Tire Service Co.* ..... 55
*U. S. Cast Iron Pipe and Foundry Co.* ..... 61
*United Engineers & Constructors, Inc.* ..... —
*Welsbach Company* ..... 13
*Westcott & Gries, Inc.* ..... 9
*Western Gas* ..... 57
*Western Pipe & Steel Co.* ..... 51

Mueller
Straight Way
Iron Body
Gas Service Stops

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All Mueller gas stops, keys, nuts and washers are made of Mueller Red Brass—and all Mueller Brass is under strict laboratory control, which insures a metal of uniform quality and strength.

It's the Mueller careful methods of manufacture that give Mueller Iron Body Stops their deserved reputation for reliability.

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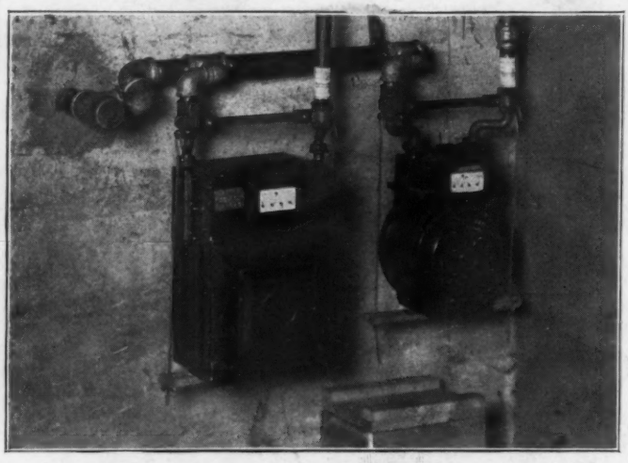

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L-S Adjustable Meter Connections make possible the perfect alignment of meter swivels with the meter tubes. After adjustment has been made, the connection becomes the permanent protector for the meter.

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**Columbus, Ohio**

**New England Representative**
**The Eastern Service Company**
**250 Stuart St., Boston, Mass.**

**Chicago Representative**
**The Utilities Service Co.**
**122 S. Michigan Ave.**

**San Francisco Representative**
**A. P. Bartley**
**163 Second St.**

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19